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ART. I.—SYMPATHETIC IMPRESSIBILITY.

There are obviously but these three agencies to affect us: the material substances around us, which affect our *Physical Impressibility;* the *relations* of things, which, as motives, affect our *Mental Impressibility;* and the physiological life and power, which affect our own constitution sympathetically.

From *Mental Impressibility* arise the sciences of Education and Government. From *Physical Impressibility* arise the sciences of Medicine and Hygiene. From *Sympathetic Impressibility* arise a true Anthropology, and a comprehensive philosophy of man and nature.

Sympathetic Impressibility is exhibited in all the phenomena of animal magnetism, in contagion, and in a large portion of the phenomena of education and social intercourse. It furnishes the most important means for the study of the constitution of man. For, as the constitution and laws of inorganic matter are best ascertained by the influence and reaction of other inorganic matter (for example, by the use of acids, crucibles, and mechanical instruments), so the constitution and laws of man, as a physiological and mental being, are best ascertained by the influence and reaction of other physiological and mental beings with whom he may be brought into contact.

Comparatively few scientific men of the present day are willing to recognize cordially and fully the fact, that the physiological phenomena of one being are capable of affecting those of another, either in contact or proximity. But the phenomena of contagious diseases are so frequent, so appalling, and so indisputable, that no intelligent man ventures to deny them. The transmission of small

pox, itch, and a few other contagious diseases, is so speedy and sure in the majority of cases of contact, that the hardiest skepticism is compelled to admit and fear the power of contagion. Yet, in respect to diseases which have a less potent miasm or influence, medical men are generally disposed to deny the fact of contagion in all cases, unless it occurs with great frequency and facility.

While Sympathetic Impressibility in the pathological mode is thus reluctantly admitted to a slight extent, the physiological Sympathetic Impressibility is almost entirely overlooked by physiological authors, or ridiculed as an absurd delusion. In the treatises upon animal magnetism alone can we find a distinct recognition of its existence.

Impressibility of all kinds is proportioned principally to the development of sensibility. It is obvious that we cannot be affected by any impression, unless we have a sensitive organ or sensibility adapted to its reception. In proportion as the sensibility is increased the impression produced by any agent becomes more powerful—in proportion as the sensibility is reduced, it ceases to affect us at all. Hence, those in whom the organ, or rather organs, of sensibility are large and predominant, are universally impressible; while those in whom the organs of sensibility are small, are generally unimpressible. The organ, or organs, of Sensibility may be found in the temples, between the ear and the external angle of the eye, near the upper margin of the cheek bone. In this region we find all forms of sensibility. The sense of hearing occupies the most anterior location—next comes the sensibility to various imponderable agencies, caloric, electricity, galvanism, magnetism, etc., while the grosser sensibilities to pain, fatigue, hunger, and thirst, extend backward to the cavity of the ear.

Each percipient faculty renders us impressible to its object in proportion to its development. The sense which recognizes light, enables us to derive pleasure and stimulus from the sunshine. The sense which recognizes the electric fluid, enables us to be powerfully affected by its shock, or even to feel the influence of the passing clouds. The sense of hearing, which recognizes sound, enables us to be ravished by music and pained by discordant noise. That most subtile sense which enables us to perceive the human nervous emanations (located in the most superior portion of the organ of Sensibility), is the means of our being affected by them; and as we are affected by them, our own nervous action is modified or controlled. The nervaura of another constitution modifies the action of our own. The power of being thus affected through the nervauric sense, is what we technically denominate impressibility when speaking of experiments upon the brain.

In those who possess a high degree of this impressibility, the application of our hand to any part of the head will produce an effect upon the brain, changing the action of the organs, and modifying the character. Applied to the forehead, it renders the mind more active and clear; to the most lateral portion of the occiput, dull

and sluggish; upon the upper surface of the head, the effects produced are extremely mild and pleasing; upon the basilar surface, near the ear, the effects are disagreeable, depressing and irritating. Upon the upper part of the occiput, the influence is invigorating and ennobling; upon the portions anterior to the ear, extremely prostrating. These effects are not merely different states of mind—they are absolute changes in the action of the controlling powers of the constitution, and are accompanied by changes in the circulation, the pulse, the breathing, the secretions, the muscular strength, the appetite, the opinions, and the expression of countenance, showing that they have taken deep hold of the constitution. A physician holding the pulse could perceive that great changes were going on, and would sometimes compare the effects to those of the most powerful drugs.

Such is the impressibility which we make the subject of our study—a state in which all the emotions and physiological powers that we possess may be put in motion by an influence so subtile as to escape the senses—a state of delicate sympathies and acute sensibilities, yielding, chameleon-like, and susceptible of endless diversities—a state in which the power of the brain concentrates into the organ which we excite, and wherever we apply the hand, we concentrate a degree of excitement which makes the organ predominate over all others. If such persons have to undergo a surgical operation, place your hand upon the part of the head marked Hardihood, and they feel comparatively little pain; if they have a difficult intellectual exercise of memory, reason, calculation, music, composition, &c., place your finger upon the appropriate frontal organs, and you impart a material assistance; if they are melancholy, excite their organs of Mirth and Playfulness, and their melancholy is dispelled. If their health is deranged, ascertain the deficiency, stimulate the languid functions by the application of the hands, and in a short time you may realize the best effects which can be produced by medical treatment.

Such is Sympathetic Impressibility—a state in which we have much less need of medicine—in which a thousand effects can be produced that no medicine could possibly effect—in which the machinery of life lies naked to be wound up and regulated at will.

The brain of an impressible person is like a delicate harp, which we may freely touch to bring forth every note it can produce. This harp is so incased and concealed, that it has been denied by some that it had any separate chords, as if the music came forth by Divine inspiration, without any apparatus to produce it. But now that we can touch the separate strings, the dispute is at an end—the followers of Gall and Spurzheim have a perfect triumph, for their great principle is settled beyond a doubt—the brain has distinct organs, and more numerous by far than Gall supposed.

This form of Impressibility, which admits of a local concentration of excitement and development of the functions, is the most important form in which it is displayed, for it enables us to stimu-

late each organ of the brain, and develop each faculty so distinctly, that this process may be very properly called a *psychological anatomy* of man. And as the anatomizing of a single subject develops anatomical science that applies to the whole human race, so the experiments which give the psychological anatomy of a single individual, develop the universal laws of mind and the connection between the mind and body.

But, it may be asked, is this impressibility a healthy or a morbid state? And if it is morbid, does not that fact render it deceptive and unworthy of reliance? I answer no; for physiology may be studied in morbid, as well as in healthy, constitutions. But impressibility is not by any means a morbid state; it is compatible with the highest health and vigor.

One of the first specimens of remarkable impressibility that I ever observed, was in a vigorous, gray-headed hunter of the Southwest, who was entirely skeptical at first, but finding himself prostrated in strength, and confused in mind, scarcely knowing where he was, and unable to walk steadily, began to think that I had been playing off some ancient species of magic upon his brain. As the old gentleman (Capt. T.) retired from my room, I could not but feel a sympathetic anxiety as I observed his trembling gait, even after I had attempted to restore him. I was much gratified when he called, next morning, to receive a more effectual relief from the power which had put him, as he said, "all out of order." I succeeded in restoring him, but as I did not then understand the philosophy of Disease and Insanity, the restoration was not so perfect as it might now be made.

In Massachusetts, I met with a vigorous old gentleman, of substantial character and intelligence, who was certainly, according to his own account, and his general appearance, one of the most perfectly healthy persons I had ever seen. He proved very distinctly impressible. Without multiplying examples, we may remark, that although impressibility does not indicate health or vigor, it certainly does not indicate disease or debility, mental infirmity, or credulity. Many of the most impressible persons have opposed or ridiculed Neurology, until compelled by repeated experiments upon themselves to acknowledge its truth.

Impressibility, then, is not a morbid state, but one which gives peculiar facilities to both morbid and curative processes.

Were impressibility general, disease would be more easily controlled—medicines would be less needed, society would be more harmonious, public opinion more unanimous. But, on the other hand, sensibilities would be more acute, popular excitements more sudden and diffusive, diseases more contagious, and bad examples influential as well as good. The power of man over man would be increased, and the ascendency of a strong character would be more absolute. Society would become more sympathetic, and individual peculiarities would be diminished. In the future progress of society, I have no doubt that a higher intellectual and moral

cultivation will produce a more general impressibility, and that it will be directed to the best results. At present impressibility fulfills one important object, in harmonizing those who live together, and rendering the conjugal union more happy. The characters, habits, tastes and constitutions, of those who are impressible, gradually blend and become identified. The wife becomes suited to a husband whose sphere of life and whole character are opposite to her own; and as woman is more generally impressible than man, she is the most changed by the matrimonial alliance. Often the gay, accomplished lady sinks into the household drudge, or the rude country girl changes into the dignified and graceful fine lady of the city. Impressibility—an admirable quality for a lady—is frequently found among the most charming of the sex. The constant culture and shelter which they have enjoyed, and the balmy moral atmosphere in which they have lived, have diminished that hardy force of character which might enable them to impress their own will upon others; but they have also given a delicate pliability, a genius for adaptation which is more important to conjugal happiness than any force of character. Men often shrink from women of talents, from a suspicion that they have too decided a character to be impressible and yielding in the intimate relations of domestic life.

Impressibility has its intellectual advantages. As a minor intellectual power it increases our sympathetic consciousness of character. We are so strongly impressed by a good or bad character in another, we feel so distinctly the effects of their personal presence, that we are not to be deceived in our sensations. One individual gives us immediate gloom, another enlivens our spirits; one makes us happy and talkative, another locks up all our faculties with a chilling oppression; one inspires us with unlimited confidence at the first interview; another, though highly recommended, fills us with a vague and inexplicable distrust, in spite of our efforts to be pleased. As we become more impressible, we are more and more carried away by these impressions, and thus forced into presentiment or consciousness of character. I do not say that impressibility gives us the insight, but I do say that it gives more vivid and delicate impressions upon which to reflect. Hence the impressible often manifest a remarkable discrimination and soundness of judgment in reference to character. Thus the wife is often a safe and quiet monitor to her husband, warning him against those associates whose lurking vices are too well concealed for him, but are instantly detected by her delicate sympathies. Thus impressibility increases our prudence, and it heightens that delicate social tact in which woman is generally superior to man.

As to force of character, impressibility detracts somewhat from our strength and greatness, unless accompanied by the antagonistic organs; but as man is an aggregate of opposite faculties, he may possess impressibility in conjunction with great courage, hardihood and force of character. I have demonstrated impressibility in per-

sons of commanding energy, both of mind and body—in those who impress and lead society, as well as in those who follow and admire.

One of the most remarkable men I have ever known, as to mental and bodily powers, was sufficiently impressible to be relieved of a distressing cough, by the application of my hands, upon the middle parietal bones, upon organs which have a soothing effect upon the lungs. The effect was not favored by any credulity on his part, for he was remarkably skeptical and difficult to convince upon all the subjects of his conversations.

Seeing, then, that impressibility is compatible with high health, and with an imposing vigor of mind and body, I look upon it as a blessing to the human race—as a quality which ought to be cultivated because it may be the means of so much good.

The benefits to the impressible are threefold: 1st, the relief from pain and disease; 2nd, the regulation of mind and body, or general education and hygiene; 3rd, the power of social adaptation. For either of these purposes, impressibility is a rich benefaction to the human race. For its application to therapeutic, hygienic or educational benefits, we must be indebted to neurological discoveries, which give us the key to the impressible constitutions. There are, in our country, at least two or three hundred thousand persons who possess, in a very considerable degree, impressibility, and who may, therefore, have their health so regulated, by proper manipulation, as to have very little, if any, occasion for any species of medicine. The amount of benefit which may be conferred upon them, in the relief from harsh medication and in the speedy cure of disease and pain, by processes which do not require the attendance of a regular physician, and which are more effectual than any medicine, is a matter of high importance to this class of persons. All who are impressible, or who have intercourse with impressible persons, should be familiarly acquainted with the practical experimental portions of neurology, and competent to give this relief or guide its administration. Neurology gives us the key to the impressible constitution, and those who possess this key have opportunities for its use in every society. They carry a healing power which is perfectly safe for the body, and they can also minister to the mind, and modify the character of their patients by giving temporary predominance to any organ which needs cultivation. They carry a power which, but a short time since in the history of our race, would have entitled them to hanging or drowning as practitioners of witchcraft; and which even now entitles them to be considered eccentric enthusiasts by those who will not or who cannot investigate a science. But the gratitude of the relieved, and the fascination of science, are a sufficient compensation without the applause of the unthinking.

Other sciences may have fascinations for their votaries, but there are none so fascinating as this to a well balanced mind. None that appeal so strongly to reason, observation, fancy, admiration, wonder,

invention and hope—none that are so interwoven with the love of man—none that so illustrate Divinity, and raise the student toward the divine light of "another and a better world."

Let me not insist too much upon the benefits to the impressible. That is a subject, it is true, which is prominent in the minds of the public; but it is one to which I do not so often allude, because there are other more important results, of a wider scope and higher aim. When all mankind become impressible (and perhaps some future century may realize the thought), the power over the impressible constitution will be a more important object. We shall then possess, in our simple processes, the grand panacea for the human constitution. Like Paracelsus, the neurologist might exclaim, "the monarchy of physic is mine." But until this general impressibility exists, we will look rather to the great results which concern all men, whether impressible or not.

The great result of impressibility—the richest gift of Heaven to man—is the revelation of the laws and mysteries of the human constitution. These can be thoroughly learned only by the analysis or anatomy of the physiological and psychological powers. This anatomyzing is to be performed only upon impressible constitutions. They furnish the subjects for our psychological anatomy. They enable us to take each organ out by itself, and study its functions separately and in combinations. And as the cadaverous anatomy is the foundation of the science of medicine, so our living anatomy is the foundation of the greater science of the living, soul-endowed man. Physical anatomy supports a physical science, but the dynamic anatomy is the foundation of an *unlimited* science, or rather of an unlimited progress in knowledge. One is the science of Matter and Death—the other is the science of Power and Life. And as the agent is above the instrument, mind above matter, cause above effect, so is dynamic above cadaverous anatomy.

It is for the sake of this anatomy of man, that we should hail the discovery of human cerebral impressibility as a great and decisive event. It was the hope of such results that inspired me to make the attempt, and gave me an enthusiastic ardor in my first success.

It is for this that we rejoice in human impressibility; and it was, perhaps, much for this purpose that man was made impressible. Destitute of impressibility, the secret forces of life would have been locked up in rigid concealment; but, with that quality, we are able to trace muscularity, digestion, respiration, secretion and circulation, to their controlling sources in the nervous matter, and to call forth love and hate, courage and fear, hope and dispair, sanity and insanity, intelligence and imbecility, from their locations in the convolutions of the brain.

Endowing man with impressibility, is like rending the vail which covers the mysterious union of his mind and body; or rather, it is like putting a window in his bosom through which we may study

the springs of life and thought. Impressibility is the window. Let that window be closed, and ages after ages would roll by, as they have already passed, without the attainment of a true science of man. The development of this true science, with all its medicinal, educational, social and political results, is the great benefit of impressibility. And this development has been delayed until the present period of human progress, because now, for the first time, the world is prepared to receive it. Now we may teach without judicial charges of witchcraft and heresy; now a free republic gives scope to innovations; now collateral sciences are sufficiently advanced to give us their support; and now the human mind is waking up to deep and earnest thought, and demands incessantly a knowledge that is more definite and satisfactory.

To meet this demand, we repeat our experiments and anatomize the living man. The small number of the most highly impressible subjects, is sometimes thoughtlessly adduced as a serious difficulty. But if the world contained only one person of the impressible constitution, he alone would be sufficient for our indispensable purposes. The essential faculties and organs of mankind are found in each man. Anatomical observations upon one give the universal anatomy of the race; and in our *psychological* anatomy, the study of one individual may be prolonged for a life-time.

But the number of impressibles is sufficient for thorough demonstration of the science and instruction of society. I believe that I have never addressed a public audience which did not contain several impressible persons, nor instructed a private class without demonstrating my principles upon some of its members. In every hundred individuals we will usually find one, two or three, who have the higher grades of impressibility, fit for the most interesting experiments, and five or ten who have it in a moderate degree.

It is more prevalent in warm climates, and in the summer months. The further South we go in the United States, the greater the impressibility. The impressibility of Louisiana is probably four or five times greater than of New England.

Whatever imparts a delicate and subtile vitality to the constitution, without at the same time producing any rigid tonic effect, promotes impressibility. That which braces and hardens the constitution, diminishes impressibility; that which relaxes, refines and gives intellectual activity or moral and spiritual elevation to the character, promotes it. The heat and sunshine of a Southern climate tend to produce excitement, debility, wakefulness, intellectual vivacity, exalted sensibility and the more gentle, generous and unsteady moral emotions. This is a state admirably calculated to promote impressibility. In the colder climates excitability and sensibility are diminished, the intellectual vivacity is checked, the moral emotions assume a sterner and steadier character, digestion, nutrition and other physiological processes, are more active, and the whole character has less spirituality, less mobility. Even in

the limited range of our own country, much of these effects of climate may sometimes be observed.

Hard labor and exposure to the cold lower the sensibility and the intellectual activity most efficiently. Luxurious and effeminate habits tend to increase it, especially if accompanied by intellectual and social pleasures.

The angry and selfish passions completely destroy it. The affections and moral sentiments give it powerful support. Impressibility is therefore a variable quality. He who is highly impressible to-day may be almost destitute of the quality a few months hence. The first impressible person with whom I met—the intelligent lady with whom I made my first discoveries in 1841—was reduced in her impressibility nearly one-half, by removing to the country and engaging in the domestic cares of a farm. One of the best illustrators of impressibility that I have ever seen, a gentleman of clear intellect, was nearly deprived of his impressibility by a disappointment in the gratification of his hopes and affections in an affair of love; which reduced him to a state of miserable gloom. Whenever impressible persons indulge the angry passions, whenever they become engrossed in pecuniary and selfish objects, whenever they become morose and gloomy, whenever they are brought into frequent and angry collisions in society, they are sure to lose much or all of their impressibility.

Hence we must not be surprised at their variable conditions of impressibility. In one it will be diminished by domestic cares, in another by the fatigues and vexations of business, in another by grief, in another by angry contests, in another by labor, in another by change of climate, &c.

The influences that promote impressibility are generally good: religion, love, hope, benevolence, sympathy, mirth, fancy, modesty, friendship, tranquility, ideality, poetry, music and mental excitement, contribute to its support, while their antagonists contribute to its destruction. I believe that all high religious excitement involves some degree of impressibility, and that it abounds amid revivals of religion. The best displays of impressibility that I have met, have been among the highly moral, intellectual and refined, whose constitutions had not been exposed to hardship, and whose minds had not been debased by contact with vicious society. Seek impressibility among such, and we will find the results marked by simplicity and truth.

But impressibility is also promoted by relaxing and morbid causes. Exhausting mental excitement and prostrating disease, often develop it. Morbid parts of the body are more impressible than the healthy portions; and persons who are not impressible in health are often somewhat impressible during an attack of disease. The impressible constitution may be detected in a few moments by experiment, but I do not know any certain mark by which it is, in all cases, to be recognized at a glance. It is often accompanied by delicacy, refinement and mildness—by a soft and yielding ex-

pression of the eye, and by an enlargement of the pupil; but we may find it where none of these signs are conspicuous, in persons whom we would be slow to suspect of possessing such a quality.

The indication upon which I place the greatest reliance is the size of the pupil of the eye. Whenever I see a large pupil I wish to try the impressibility, and expect to find it distinct. This large pupil is owing to the relaxation of the circular fibers of the iris, which may be owing either to a general laxity of the temperment, or to a less irritable state of the eye, which receives with pleasure the influence of light, without feeling that irritation which causes the contraction of the iris.

This large pupil has been observed by physicians to be associated often with a pulmonary tuberculous diathesis.* The "fair and fine skin, fine soft hair, dilated pupil and large upper lip," which are said to indicate a tuberculous diathesis, indicate a predominance in the constitution of the anterior and upper portions of the brain. They are, therefore, highly favorable to impressibility, and we may expect to find a large number of impressible constitutions among those of this diathesis. One of my first discoveries was made upon a fair and delicate girl, then in the incipient stages of the disease which, in less than two years, carried her to the tomb.

But it must not be inferred that impressibility necessarily implies the existence of any morbid diathesis. We find impressible constitutions in almost all temperaments and states of health. I have found some of the healthiest persons in the community the most impressible. The most vigorous active, and healthy female whom I saw at Boston, who had never been confined by a day's sickness in her life, and who could walk eight or ten miles before breakfast, and then attend to her daily occupations without fatigue, was one of the most impressible I have ever seen; and when I first tested her impressibility, fell back from exhaustion into her chair when I excited the organ of relaxation.

We frequently find impressibility when there is nothing very remarkable about the pupil, and we sometimes find the enlarged pupil with very little impressibility, but this is so seldom that the expanded pupil is to me the chief indication of the impressible temperament.

The modes of testing it are very simple. There is an organ lying in the temples, near the junction of the frontal and sphenoid bones, about one inch horizontally behind the outer extremity of the brow, which gives us the best indication. It is the organ of Somnolence, *i. e.*, its function is to produce a somnolent state. It lies in continuation of the organ of Ideality. The lower portion of Ideal-

* "According to Dr. Withering and Dr. Darwin, the most constant symptom of a consumptive habit is the unusual magnitude of the pupil."—*Young.* Dr. Elliotson says, "the dilated pupil" and "the tumid lip" are "two of the chief marks of scrofula."

ity produces reverie and day-dreaming, and passes gradually into the organs which estrange us still further from surrounding scenes. This estrangement of the mind, this partial unconsciousness, this combination of mental activity with the outer appearances of sleep, which is neither altogether sleeping nor altogether waking, may properly be styled somnolence, or a tendency to sleep. Somnambulism, somniloquence, and all other forms of sleep-waking belong to this region.

I prefer the organ of somnolence in testing impressibility, because its effects are so prompt and obvious. Placing one or two fingers upon it, while we stand or sit before our subject, we soon witness the effect of exciting this organ. The first effect is an increased sensibility of the eye, and a tendency to close it. He begins to wink a little more frequently than usual, the lights appear brighter to him, and perhaps his eye is too sensitive to look steadily at a lamp, or at the sunshine. Sometimes it even reddens and becomes watery. The winking, at first brisk, now becomes more prolonged, the eyelids move slowly and heavily, and when the upper eyelid is down it appears reluctant to return. The expression is more quiet and dull. The general influence is soothing. The winking is generally irregular, but sometimes the movement is quite regular, and sometimes the eyelid has a remarkable quivering. When you witness these symptoms you may be assured of impressibility, and they may be produced without your subject being aware that he is under any peculiar influence. You are not obliged to ask him any questions, and he is so unsuspicious of your object that he cannot assist or thwart the effect which he does not observe. You may make the experiment and satisfy yourself that he is impressible, without his knowing why you have come to that conclusion.

Some who have well disciplined minds will observe everything immediately and state what they feel, but the majority will not recognize any effect until they feel distinctly drowsy, and this you will perceive in the countenance much sooner than they will confess it.

If this operation is performed upon one of an interesting degree of impressibility, you will witness the winking and slight somnolence in the course of the first fifteen minutes; frequently you will observe the effect upon the eye in the first half minute. Let the operation be prolonged, and in those of dull temperament the appearances will resemble sleep; but in those of more intellectual activity the dreaming or the train of somnolent ideas will show clearly that it is not sleep. In most cases your subjects will not lose their consciousness of what is going on, although they will feel indisposed to move or to participate in the conversation.

Having thus ascertained the impressibility of your subject, all the effects which you have produced will be removed by brushing lightly and rapidly over the spot you have touched, carrying the fingers upward and backward toward the crown of the head. In doing this the fingers must be perfectly pliable and lightly applied,

scarcely touching the skin. This process disperses the excitement from somnolence, and carries it toward the organ of Vigilance. Placing the fingers upon the organ of Vigilance, a few minutes will complete the experiment, by rousing the subject and removing every trace of drowsiness. His countenance is now animated and his eyes seek the light. But there are some of a drowsy, unintellectual constitution, who will not be fully restored until you have touched the organs of Consciousness and Vision.

The peculiar advantage of this experiment consists not only in the fact that its effects may be distinct without the knowledge of the subject, but in the fact that it promotes impressibility. When you touch Somnolence, your finger may also touch the adjacent organ of Impressibility, and whatever excitement you may produce in this region contributes to render the brain more fit for future experiments. It is commonly supposed that the repetition of Mesmeric experiments renders the subject more impressible, and it is true, because these experiments are accompanied by somnolence.

The organs lying a little lower, in the middle lobe, are equally distinct in their effects, but more disagreeable and injurious. The organ of Relaxation, for instance, lying in front of the opening of the ear, and a little below the cheek bone, is very convenient for your first experiment. Apply your fingers upon this spot when your subject is standing erect, and in a few minutes he will be conscious of a general debilitation, and will probably acknowledge a weakness of the knees. He imagines that he is fatigued by standing erect, but you can remind him that he is not usually fatigued by standing a few minutes, and that his attitude is less fatiguing than your own. Continue the experiment and you may observe that he is growing unsteady, he wavers to and fro, and, if left to himself, staggers or walks a little unsteadily when he moves about. If he understands the feelings of intoxication experimentally, he will probably compare them with his present sensations. If it is carried a little further, he staggers and falls. Sometimes, when he discovers the object of the experiment, he will brace himself against it, and hold up firmly, until, entirely overcome, he falls to the ground. You should not make such an experiment where he would be exposed to any injury by falling, for I have narrowly escaped serious accidents from this cause.

This experiment is not so appropriate to those who are very feeble or diseased, for everything that debilitates generally favors disease. Such persons will be apt to complain of nausea, vertigo, trembling, palpitation, sickness, &c. This must be counteracted as before, by brushing backward and upward from the spot touched, and by putting the hand upon the region of Health and Energy.

But upon the healthy this experiment may be carried as far and repeated as often as you please, provided you always relieve them of the effect, as I have just mentioned. I must impress it upon you, and I cannot repeat it too often, that when you experiment upon an impressible person, you should hold yourself strictly

responsible for the preservation of the mental and bodily health. If you are acquainted with the principles of neurology, and make experiments to gratify a scientific curiosity, you are bound to see that no injury is produced in those who are obliging enough to submit to your operations. None can arise unless you are culpably negligent, or unless you have been deceived. If your patient has some disease which you do not perceive, and of which he does not inform you, you may unconsciously make some experiment which would aggravate it; but even if he is diseased, if you know the nature of his case, you may make a great many experiments upon him with perfect impunity, or with benefit to his health. I have frequently found the subject sick, sometimes in bed, when I wished to make an experiment, and been obliged to relieve him before I could make my experiments for the purpose of investigation.

But if your subject is well and healthy, you are inexcusably negligent if you do not keep him so. Whenever any excitement of an organ has been produced, it is your duty to disperse that excitement by passing your fingers over the spot in a light and rapid manner (scarcely touching), as if mechanically scattering an accumulation at the surface. And when a round of diversified experiments has been made, you should remove any morbid or unpleasant symptom that has been left, and place your hand upon the region of Health and Energy, so as to leave the system in a natural and vigorous state.

Bearing in mind this precaution, let us return to the experiments. In the two which I have just mentioned, your subject will not probably understand the effect to be produced until he feels decidedly drowsy or weak. There is another equally manifest in its influence, and as little apt to excite any anticipation. The organ of Mirthfulness lies upon the upper surface of the forehead, almost vertically above the pupil of the eye, nearly at the roots of the hair in the majority of heads. By touching this organ you produce a pleasant, soothing influence, a more cheerful frame of mind, a lively flow of animal spirits and ludicrous thoughts, or an uncontrollable burst of laughter, according to the impressibility of your subject. Sometimes the laughter will be so violent and irrepressible, that you will be compelled to touch the back of the head and the region of Firmness to restrain it.

After you have excited mirthfulness, your subject or his friends may consider the laughter accidental, or owing to some other cause. Perhaps they think that the mere act of touching the forehead for such a purpose is irresistibly ludicrous. This idea is apt to arise in the mind of the patient, for as soon as he feels the ludicrous emotion he discovers the ludicrous in everything around him, and naturally supposes that the objects which now appear so ludicrous were really the causes of his mirth. If so, while the laugh is yet dimpling his countenance, transfer your fingers to the antagonist organ at the back of his head and watch the change. He becomes very grave and sober—perhaps his friends are sobered too by sym-

pathy—or perhaps his sudden and extreme gravity strikes them as really ludicrous and produces another burst. But now the laughter only annoys him for he cannot participate. He feels very grave and depressed, a little morose—almost angry. If accustomed to the melting mood he may even shed a few tears as his sorrows are recalled to his mind. His companions, may now endeavor to excite his mirth by jest and laughter in vain. If any incredulous philosophizer suggests that this too is all a mere accident or a natural reaction, silently transfer your finger to the organ of Mirth and disperse the excitement from the occiput—again you see a bright laughing face and bursts of merriment. If you are not afraid of taxing your subject too heavily, you may repeat the alternating experiments as often as you please. If he is very skeptical himself but very impressible, you may banter him to laugh if he possibly can while under the morose influence.

In females who have recently suffered from domestic calamities and whose griefs are fresh, you should be cautious in exciting this sadness, which renews all their sufferings. You may make all your operations more striking by carrying them to an extreme. Paroxysms of grief, convulsions of laughter, falling, fainting, convulsions, vomiting, screaming from pain, &c., are very startling to the spectator and satisfactory even to those who cannot reason; but we have no right thus to trifle with the health of those who entrust themselves to our hands, unless they give express permission, or are themselves so skeptical as to defy your power and to distrust the experiments which they witness upon others. I have often taken hold of these skeptical characters who would not believe anything that others felt, because they did not feel it themselves, and I confess, I have sometimes inflicted a little pain upon them for their own benefit. When their sufferings are so great as to compel them to cry out for relief, they are not apt to be troubled again with doubts whether the sensations are real or imaginary.

Skepticism in its proper sense is a very good thing; but that obstinate infidelity and suspicion which are commonly called skepticism, are highly immoral and pernicious to society. That kind of infidelity which refuses to reason, but must see and smell and taste; which would not believe that electricity affected the nerves, unless they were shocked themselves; which, in the time of Fulton, would not believe that steam could be applied to navigation, because they had not seen a steamboat—is a curse upon humanity.

The testimony of persons who are as respectable, moral and intelligent as ourselves, is as good as our own testimony, and when I hear one who has this testimony before him, or who witnesses successful experiments upon his associates, still profess to disbelieve all that he has not felt himself, as if his senses alone could be relied upon, I ask myself what is the defect in his mind or in his education? This kind of infidelity indicates such a littleness, such a poverty of sentiment and narrowness of mind, that I should be deeply grieved to detect it in any one whom I respected. When I find

that impressible persons have imbibed such principles from their associates, I find the only effectual cure, is to give them sensations so oppressive and painful that they can never forget their reality, when others would persuade them that it is all a fancy.

To do this, you may excite the region of Disease, lying at the cheekbone. Hold your finger a few moments here and you will produce the most unequivocal effect. The effects will be morbid but may present a great variety of symptoms. As soon as the organ is excited, you have established the morbid diathesis throughout the system, and then whatever part of the constitution is particularly weak or predisposed to disease becomes immediately deranged. You may have headache, rigors, nausea, vomiting, fainting, palpitation, cough, flatulence, dyspnœa, and every species of local pain or inflammatory symptoms. The action of the heart will be weak and irregular, and all the feelings of the patient such as belong to actual disease. You will generally reproduce the disease to which he is most liable, and he will be forcibly reminded of his severest sufferings on the bed of sickness. His symptoms will be sufficiently distinct in a short time to alarm his friends, and it is better not to perform such experiments in the family circle or among the near relatives and friends, if they are at all timid, for they will not reflect at the moment, that the same power which produced can also arrest the attack of disease.

The experiment may be very conveniently, and just as effectually, made by placing the fingers of the whole hand upon the temples and cheeks, so as to cover Disease and the surrounding organs. The organs above Disease will increase the impressibility—those below it will increase the relaxation and debility—those behind will increase the painful excitement. The most painful experiment will be made by touching Disease and the organs just behind it as far as the top of the ear—the most prostrating by touching the organs just below and above.

If you venture upon this experiment, you should relieve your subjects instantaneously. After a minute's suffering of the thorough morbid excitement, they will feel as if they had been sick a week—and if you carry these things to an imprudent length, you may create a prejudice against your experiments both in the subject and in his acquaintances, which it will be difficult to remove.

If the prostration and suffering come on suddenly, you must be equally prompt in your relief, for the mischief is proportional to the delay. You will then disperse the morbid influence, as already directed, and place your hands upon the region of Health. It will sometimes be necessary also to touch Vitality, and to stimulate Mirthfulness, and the occipital organs generally, to restore a pleasant state of mind and body. Under this treatment every vestige of the unpleasant effects may disappear in five minutes. But sometimes you will find it much harder to dispel than to produce the morbid condition, and if you have allowed it to remain too long, for the purpose of gratifying the barbarous curiosity of infidel observers,

you may produce effects, which will last for days in spite of all your efforts to restore the health. Were you to leave your patient after you have thoroughly established the morbid diathesis, without doing anything for his relief, he would be obliged to call in a physician and undergo a course of medical treatment, according to the character of the symptoms developed. What medicine would then accomplish in days or weeks, for your patient, you may accomplish in hours or minutes by the nervauric operations.

INSANITY AND ITS CAUSES.

An able report on Insanity has been made by Dr. Brigham, of the New York Asylum (since deceased), of which the following sketch is quoted from the Vermont Gazette:

"On the subject of hereditary insanity, Dr. Brigham informs us, that contrary to the opinion of many, he has found the inherited form of insanity as curable as any other.

"Of the two thousand and fourteen patients who had been at the Asylum, one thousand and seventeen were men, and nine hundred and ninety-seven women, and six hundred and thirty-seven were known to have insane relatives. The statistics on this subject also show that insanity is, generally, a little more likely to be transmitted by the mother than by the father—and that mothers are considerably more likely to transmit it to daughters than to sons; while the fathers more frequently transmit it to sons.

"Among the frequent causes of insanity, in those not disposed to it, is the over indulgence of the appetites and passions in early life; and to those who inherit a tendency to this disease, such a course is highly pernicious. The utmost attention should be given to securing a good bodily constitution. Such children should be confined but little at school; they should be encouraged to run about the fields, and take much exercise in the open air, and thus insure the equal and proper development of all the organs of the body.

"They should not have the intellect unduly tasked. Very early cultivation of the mind, and the excitement of the feelings by the strife for the praise and the honor awarded to great efforts of mind and memory, is injurious to all children, and to those who inherit a tendency to nervous diseases or insanity, most pernicious. In after life, persons thus predisposed to insanity, should be careful to avoid engaging in any exciting or perplexing business or study, and should strive under all circumstances, to preserve great equanimity of temper, calling to mind the words of wisdom, 'He that is slow to anger is better than the mighty; and he that ruleth his spirit than he that taketh a city.' In Dr. Brigham's opinion, the most frequent and immediate cause of insanity, and one of the most important to guard against, is the want of sleep."

ART. II.—RESEARCHES IN ORGANIC CHEMISTRY.—(Continued from page 340.)

BY DANIEL VAUGHAN.

The existence of a mysterious power confined exclusively to the leaves of plants, and alone capable of effecting the greatest and most important chemical operations, should be admitted only when proved by very conclusive evidences, or where shown to result from natural laws. It is not surprising, therefore, that practical men have been so slow in receiving the opinion, that carbonic acid alone is the proper food of plants. Even many chemists have again recurred to the old theory which ascribes to the soil alone the office of sustaining vegetation. On the other hand, the defects which this theory presents, have furnished the chief arguments employed to sustain the doctrines of Priestly and Liebig; and if the opinion, that plants are supported by the soil, be once disproved, we are constrained to admit, that they live by decomposing the carbonic acid of the atmosphere.

It must, indeed, be acknowledged, that the old humus theory is untenable, and it seems impossible that vegetable life could be sustained, for any long period, by the limited quantity of carbon in the soil, while no new supply is to be obtained unless from the mold which remains after decay or putrefaction. The long continuance of fertility which some arable lands exhibit, cannot be reconciled with the waste to be witnessed in the organic matter, which is regarded as the great fertilizing principle. Crops are yearly removed from the soil, and the portion of carbon thus withdrawn from it, is replaced by a much less quantity in the form of manure—and frequently even this inadequate compensation is withheld—yet the productiveness continues for several ages. Indeed, nearly all the carbonic acid produced at the surface of our globe, must be formed at the expense of the organic matter of the soil. The wood which is used as fuel, must be considered as so much carbon removed from our fields and consigned to the air in a gaseous form. The carbonic acid produced by the respiration of men and animals, whether we regard it as derived from the blood, or from the food they receive, must come indirectly from the soil, the primitive source of animal and vegetable nourishment. In the course of their decay, especially during their conversion into mold, plants continually emit carbonic acid; and thus a large amount of carbon is transferred from the surface of the earth to the atmosphere. In addition to this, the humus itself is in a state of decay or fermentation, during spring and summer, producing a large supply of carbonic acid, and causing a consumption of vegetable food perhaps greater than could arise from any of the preceeding causes.

But the chief difficulty attending this theory, is presented when we consider the manner in which humus is supposed to supply nourishment to plants. If it dissolves in the waters which their roots absorb, it is equally liable to be dissolved by all the waters which flow from the land, and it must be conveyed by them to the ocean. As the greatest quantity of rain falls at those seasons of the year when the growth and nutrition of plants are suspended, and as only a small portion of the summer rains is absorbed by their roots, the amount of carbon which they received from the land, is small in comparison to what is continually removed to the sea by rivers. A large portion of humus likewise accompanies the waters, which penetrate to the lower strata of the earth; nor can we agree with Berzelius, that the roots of trees seek it and bring it back in such a manner that it is not lost to vegetable life.

Could we estimate accurately the waste of mold from all the causes I have mentioned, there is much reason to believe that few lands could be found capable of continuing fertile for more than twenty years; and it would seem evident that, in consequence of the rapid consumption of vegetable nourishment, the surface of our globe must be doomed, in a short time, to perpetual sterility.

It is not, therefore, without reason that scientific men have advocated the necessity of a source of vegetable food, independent of the organic matter of the soil, and that the alchemists ascribed to vitality the power of effecting a transmutation of inorganic substances into the various productions of the soil. Since it is necessary, however, that the atmosphere should be purified from the immense quantity of carbonic acid, which is continually pouring into it from so many different sources, modern chemists have adopted the more reasonable opinion, that vegetation is dependent on the decomposition of this gas and withdraws it from the air. This operation must, however, be regarded as extremely difficult. Carbon has a powerful affinity for oxygen, being capable of separating it from almost every compound, while there are but very few substances by means of which carbonic acid can be decomposed. None of the materials found in the air or in fertile lands seem adequate to this decomposition; the currents of terrestrial electricity, whose existence has been lately revealed, are judged too feeble for so powerful a chemical action; and the chemist, seeing no agent capable of effecting this difficult, yet necessary operation, is induced to ascribe it to some mysterious principle peculiar to vegetable life.

As I intend to show that this, and all other decompositions concerned in vegetation, must be ascribed to natural causes, I shall first examine the nature of chemical attraction, and the variation to which it is subject. Though it is generally admitted that circumstances have a considerable influence on chemical action, it has not been suspected that this influence could ever neutralize the greatest force of chemical affinity, or bring it under the control of very feeble agents of decomposition. In scientific inquiries, however, the effect of every agency should be estimated with as much accuracy as can

be attained. I shall, therefore, begin by stating a law, which will enable us to form a tolerably correct idea of the intensity of chemical affinity. In doing so, it must not be supposed that I attempt to subvert any of the established truths of chemistry, as chemists have generally rejected the doctrines of Bergman and Berthollet, the only ones intended to enable us to calculate the energy of chemical forces or the possibility of effecting a decomposition.

The law which I intend to prove by a number of well established facts, and which will conduct us to many interesting results, may be expressed in the following words: The affinity subsisting between two substances, is diminished or destroyed by the action of a body capable of uniting with either of them or with the compound they form. Examples of the destruction of this force is presented by almost every chemical operation. Lime, instead of uniting at once with all the acids for which it has an affinity, unites with that acid by which it is attracted most powerfully, and its affinity for all the rest is completely annulled by the union. The diminution of this power, under similar circumstances, though not always so apparent, is no less evident. We cannot possibly suppose that a force could be annulled or destroyed, which was not liable to be diminished; but my proofs shall be deduced not from any theoretical considerations, but chiefly from facts and experiments. I shall, therefore, show that acids retain their oxygen, or their other elements, much more feebly when they form salts than when they exist in an uncombined state; and the same appears to be true of the oxyds of metals. When a salt is dissolved in water, the affinity subsisting between its component parts is lessened, and the diminution seems to be in proportion to the weakness of the solution. A similar effect is produced on the acids, alkalies, &c., when dissolved in the same manner; and even the water itself, employed as a solvent, has less power to resist decomposition than when in a state of purity. These propositions, which are readily deduced from the law I have stated, I shall now undertake to prove.

The first fact to which our attention must be directed, is the decomposition of carbonic acid by means of phosphorus when burned in contact with several carbonates. Oxygen has a greater affinity for carbon than it has for phosphorus; and phosphoric acid may be deprived of all its oxygen by means of charcoal, while phosphorus may be burned in contact with carbonic acid without effecting the least decomposition. But when phosphorus is inflamed in contact with carbonate of soda, it deprives the carbonic acid (of this salt) of its oxygen, and is converted into phosphoric acid, which unites with the soda, while the carbon is separated as a black powder. The vapor of phosphorus, when brought in contact with carbonate of soda at a red heat, will produce the same effect. These phenomena cannot be ascribed to the affinity of the soda for the new acid, for it is absurd to suppose an affinity for a body which does not exist, and it can only be accounted for by supposing, that the

chemical attraction of the elements of the carbonic acid, is diminished by its combination with soda.

Other facts, however, will afford more conclusive evidence in regard to this question. Potassium has a greater affinity for oxygen than carbon has for the same element, and accordingly it decomposes carbonic acid, while charcoal cannot decompose pure potassa. But if charcoal be heated in with carbonate of potassa, a decomposition will immediately ensue, and the potassium will part with its oxygen, evidently because the intensity of the force, which held them together, is diminished by the presence of the carbonic acid. The same principle may be witnessed in the deoxydation of sodium, barium, strontium, calcium, &c. In these instances the influence of affinities, which may subsequently arise, can take no part in the decompositions that ensue. A mixture of hydrate of soda and hydrate of potassa, is said to yield very readily to deoxydating agents; but potassium is obtained most readily from bitartrate of potassa, in which it is united with a large amount of other elements; and so much is its affinity for oxygen diminished by this union, that it surrenders this element to iron filings, which, under ordinary circumstances, attract it with much less intensity.

Iron is incapable of decomposing carbonic acid in an uncombined state; but if chalk be heated with iron filings in a gun barrel, the carbonic acid it contains will be deprived of part of its oxygen and converted into carbonic oxyd. Silicon cannot be obtained in a state of purity from silicic acid, or perhaps from any compound it forms with a single element, but it is procured from the double fluoride of silicon and potassium. When this compound is heated with a portion of pure potassium, the latter unites with the fluorine and silicon is separated. In the same manner boron may be obtained in an uncombined state from the fluoborate of potash. In these cases the diminution of affinity is apparent. The ideas generally prevalent in regard to chemical action should direct us to operate on binary compounds in order to obtain potassium, sodium, silicon, zirconium, boron, &c., in a state of purity; but experience has proved that success can only be attained by pursuing an opposite course, and that the energy of a very powerful chemical attraction can only be surmounted by the combined effect of other forces of a similar nature.

The formation of metallic sulphurets from salts of sulphuric acid will furnish other proofs of the diminution of chemical attraction from or by the combination of many elements. When we consider the great affinity of oxygen for sulphur and for potassium, the common idea of the nature of forces should lead us to suppose that it would be almost impossible to deoxydate sulphate of potash, or at least that the potassium in this compound should retain its oxygen as powerfully as it does in pure potassa. Yet sulphate of potassa may be deprived of all its oxygen, and converted into sulphuret of potassium by means of a current of hydrogen, which is much inferior to potassium, and not even equal to sulphur, in its

affinity for oxygen. From the difficulty of conceiving how such a decomposition could take place, many chemists long refused to admit the absence of oxygen from metallic sulphurets, and contended that the sulphuret of potassium of modern times was in reality a sulphuret of potassa; but their theoretical reasonings have at length given way to the more decisive test of experiment. The other metallic sulphurets may be prepared by a similar process from the corresponding sulphates. The facility with which oxygen is separated from these compounds, as well as from the chlorides of lime, soda and potash, and from the chlorates of the same bases, affords a conclusive proof of the variation of chemical affinity under the circumstances I have described. A similar diminution of chemical forces results from all complex combinations, as may be inferred from many other instances of decomposition; a test which, though not always correct, must be regarded as the most accurate which science now affords. To estimate the intensity of such forces from the disposition they have to combine is incorrect—since carbon, which has so great an affinity for oxygen, shows no disposition to unite with it at common temperatures, and withstands the influence of the air for many ages.

It must be reasonable to suppose that the theory which I have advanced, in regard to the diminution of affinity in solid compounds, should likewise extend to bodies in solution, whether we regard the water or other solvents as chemically united with them, or as interfering with the distance of their ultimate atoms. This opinion, which I shall prove to be correct, may conduct us to several important results, and may furnish a clue to the disposing effects which experience has always attached to solution. When a salt is dissolved in water, many facts show that the affinity of its acid for its base is diminished; yet this diminution may not always render it more liable to be separated by the means usually employed. The reason of this is obvious. The force which holds together the component parts of the salt, must be neutralized by the superior affinity of a third body for one of them; and the presence of water, which diminishes the intensity of the first force, must produce a similar effect on the second, when the resulting compound is soluble. When, however, the new salt is insoluble in water, no such effect can occur, and the presence of the fluid cannot diminish, in any great degree, the affinity of its ingredients. For this reason it generally happens, that, on the mixture of two salts in solution, the preponderance of the divellent over the quiescent affinities is decided by the insolubility of one or of both of the new compounds which are to be formed. We thus arrive at a plausible explanation of the law of Berthollet: "that when two saline solutions are mixed together, and from the mixture an insoluble salt results, the insoluble compound is formed and precipitated."

The influence of solution in thus modifying chemical action may be readily understood from a few examples. Carbonic acid has a greater affinity for potash or soda than for lime; yet, in a state of

dilute solution, lime will deprive either of these substances of carbonic acid. This singular fact is owing to the presence of the water, which neutralized the force of affinity in the carbonate of potash or carbonate of soda, while the carbonate of lime being insoluble, was in some degree exempted from its influence. If acetic acid be added to an aqueous solution of carbonate of potash, carbonic acid will be expelled and acetate of potash formed. But when a current of carbonic acid gas is passed into a solution of acetate of potash in alcohol, this salt is decomposed, acetic acid being set free, and carbonate of potash formed. The last decomposition must be ascribed to the insolubility of the carbonate of potash in alcohol, and the influence of this solvent, exerted to weaken the stability of the acetate alone, was sufficient to counteract the superior affinity of the potash for acetic acid. The same effects are equally visible in double decomposition. When muriate of lime and carbonate of ammonia are mixed together in solution, the acids mutually exchange bases, and muriate of ammonia and carbonate of lime are generated. But if the two new salts are mixed in a dry state and heated, the action will be reversed, and result in the formation of muriate of lime and carbonate of ammonia—the two first compounds. If sulphate of lime and carbonate of ammonia be mixed together in a state of solution, they form sulphate of ammonia and carbonate of lime; but if the last salt's compounds be mixed in a state of powder and slightly moistened, the decomposition will be reversed, and the two original salts will be reproduced. In both cases the presence of the water operated unequally on the different compounds, in consequence of the insolubility of the carbonate of lime, and caused changes to take place quite different from those which could result from the force of affinity.

It may be contended that decomposition in saline solutions may be explained equally well on the supposition that the force of cohesion, in the soluble compounds, co-operates with the chemical forces, and thus leads to the production of the two new salts. It is indeed evident that precisely the same effects must result from increasing the divellent affinities as from diminishing the quiescent. It may at first appear doubtful, therefore, whether we should ascribe the changes in question to the augmentation of the affinity which forms the insoluble compound, or to a diminution of that which subsists between the other acids and bases. Other considerations, however, will appear more decisive of the question. From our present limited knowledge of the nature of cohesive and chemical attraction, we are unable to determine how far one is capable of co-operating with the other, or of neutralizing its effects. The opinion that forces must be of the same nature in order to act in concert or in opposition whilst producing changes on bodies, seems to have induced Berthollet to confound cohesion with affinity; but this opinion has been rejected by modern chemists. Since all kinds of chemical attraction are similar in their mode of action, and since an identity may be traced in the principle on which they operate

on all bodies, it must be more reasonable to ascribe the modifying conditions of chemical decomposition to the action of these forces which are engaged in producing all chemical changes, than to recur to the intervention of a power which has never been recognized as a decomposing agent.

It does not seem admissible to ascribe the favorable effects which solution exercises in chemical action to the diminution or to the want of cohesion. It is more reasonable to suppose that the power, whatever it be, which weakens or destroys cohesive attraction, should produce a similar effect on the force of affinity. Indeed, when we consider that the solvent power which fluids exert on different substances, results from an affinity for them, we should conclude that it is much better adapted to annul or to control chemical than cohesive attraction. It would be, therefore, unphilosophical for us to suppose that solvents should influence chemical action only through the medium of cohesion, while they are sufficient to produce the same effects without any assistance from this new agent. Besides, the introduction of this principle does not enable us to account satisfactorily for the facts which I have noticed; as the cohesive force is not called into action till the decomposition is completed, and consequently can take no part in modifying or controlling it.

By supposing that solution causes a reduction of the force of affinity, we may easily arrive at an explanation of this and many other chemical phenomena. The forces which subsist between the several acids and bases are thus considerably weakened, and are rendered less capable of annulling the effects, one of another, by their mutual action. The bases of the salts, instead of being appropriated exclusively to the acids by which they are most powerfully attracted, are distributed among the several acids in a proportion seemingly dependent on the affinity subsisting between them. The insoluble compounds not being affected by the action of the water, will of course be continually formed and precipitated. The theory of the distribution of acids and bases has been already adopted by chemists to explain these singular facts; and experiments show that it takes place in several cases, especially when the difference of affinity is not very great: but where the difference is very considerable, no such partition or distribution has been detected, nor should we conclude, from theoretical considerations, that it should exist in any perceptible degree. When to a solution of a salt in water, there is added an acid which is incapable of effecting a decomposition, a change in the color of the liquid frequently indicates that a small portion of a new salt is formed, and that the base is divided between both acids.

This distribution is carried to a greater extent as the quantity of water increases. It is found that, in very dilute solutions, salts may exist which are capable of decomposing each other under other circumstances; and the analysis of many mineral waters shows that they frequently contain salts incompatible with each other. These singular facts prove that the force of affinity subsisting be-

tween the parts of a salt varies with the strength of the solution, and that its intensity is diminished by every addition of water. It may be difficult to determine how far this diminution may be carried, or by what law it may be governed. Like cohesion, affinity may be sometimes almost entirely annulled by dilute solution, but may be again brought into action when the water is removed. That this occurs in some circumstances cannot be doubted. Bichloride of mercury, sulphate of mercury, and some salts of antimony and bismuth, will be decomposed when dissolved in a large quantity of water, which shows that the attraction of their component parts was either completely annulled, or diminished to a very great degree.

But a most conclusive proof of this continual diminution is afforded by the action of lime and potash on carbonic acid. Potash has the greater affinity for carbonic acid, and will separate it from carbonate of lime in dry mixtures, in a state of moist powder, or even in a very concentrated solution. But on the addition of a larger quantity of water the order of decomposition is reversed, and when carbonate of potash is dissolved in about eight or ten times its weight of water, the lime is capable of depriving it of carbonic acid. In a more dilute solution the decomposition is more complete, and the potash is procured in a state of greater purity. This phenomenon can only be explained by supposing that the great affinity of potash for carbonic acid was diminished by every addition of water, until at length it was rendered so weak as to be overcome by the action of the lime, which attracted the carbonic acid less forcibly, but with an energy less subject to diminution on account of the insolubility of the carbonate of lime.

When a salt is precipitated from a solution for the want of a sufficient supply of water to dissolve it, the precipitation must have nearly the same effect on the chemical changes which take place, as if the compound were insoluble. The solid substances which thus separate from the water must be in a great measure exempted from its modifying influence; and the diminution which takes place in the action of the other ingredients must be favorable to the production of the compound which is precipitated as it is formed. It is indeed generally found that, on concentrating a solution containing several acids and bases, the least soluble salt is first formed and separated from the liquid, and that the arrangement of the acids and bases is determined by the relative solubility of the resulting compounds. I shall now proceed to other tests of the truth of this theory.

As all kinds of chemical action between bodies are mutual, it must be supposed that similar effects are produced on fluids and on the substances they dissolve, and that both acquire, by their union, a less tendency to resist decomposition. When, therefore, an acid or an alkali is dissolved in water, the oxygen and hydrogen of the latter are retained with an affinity much less than previously existed between them, and they are accordingly separated by many metals incapable of decomposing water in a pure state.

The action of certain metals in decomposing water mixed with strong acid may be regarded as one of the most mysterious operations in chemistry. It is well known that when iron filings are placed in a vessel of water, on adding sulphuric acid the water is decomposed and hydrogen evolved, while oxygen, the other element, unites with the iron and forms an oxyd, which immediately combines with the sulphuric acid. The decomposition of water by this process, is commonly ascribed to the disposition which sulphuric acid has to combine with oxyd of iron. To effect this combination it is supposed that the iron is oxydated at the expense of the water, which is accordingly resolved into its elements to supply oxygen. This opinion must however be discarded, as the oxyd can produce no effect until it is formed, and consequently can take no part in the decomposition which must precede its formation. Neither is the difficulty removed by the absurd assertion of Turner, who contends that the oxyd of iron is not formed previous to its combination with the acid, but at the same instant; and that there is no succession of changes, but that all are instantaneous. Kane ascribes the effect to the solvent power of the acid, which removes the oxyd according as it is formed; but the removal of all rust by brightening the surface, does not impart to the metal even a momentary power of decomposing water or of causing the evolution of hydrogen gas.

The theory advanced in the preceding pages will furnish the only satisfactory explanation for this phenomenon; an explanation equally applicable to the decomposition of water by other metals in the presence of strong acids. Hydrogen has a somewhat greater affinity for oxygen than iron has for that element, but this superior affinity, being weakened by the combination of the water with the acid, the oxygen leaves the hydrogen and unites with the iron, to which it is now more strongly attracted. Nitric acid, when used for the same purpose, is itself decomposed, and furnishes the chief supply of oxygen to the iron; but the sulphuric acid appears to retain its oxygen with too much energy to decompose in any considerable quantity.

Prussic acid and water, when brought into contact with muriatic acid, are both decomposed and transformed into formic acid and ammonia. Here the force of affinity in the elements of the water is weakened by the action of the muriatic acid, and accordingly its oxygen unites with the carbon and hydrogen of the Prussic acid, while the two remaining elements combine and form ammonia. The muriatic acid unites with this compound, forming muriate of ammonia. The difficulty of accounting for this decomposition on any other principle may be inferred from the following passage, intended to serve as an explanation for it: "An affinity," says Liebig, "of one body for a second, which does not exist, is quite inconceivable. The ammonia in this case is formed on account of the existing attractive desire of the acid for saturation." The kind of affinity, however, which is here objected to, does

not appear more absurd or inconceivable than the attractive desire of saturation with a body which does not yet possess existence.

Another fact will be more decisive in regard to the nature of the powers operating in these decompositions. Tin does not decompose pure water at common temperatures, yet when it is acted on by aqueous nitric acid, the acid and the water it contains are decomposed at the same time, and ammonia is formed in addition to oxyd of tin. In this case the nitric acid does not form a salt with the oxyd of tin, and therefore no effect can arise from the affinity subsisting between them. It may be interesting to remark, that nitric acid, in its most concentrated form, does not act on tin; and this singular fact reveals the important truth, that the diminution of affinity takes place between the particles of the acid as well as those of the water.

It may appear remarkable that the alkalies, which are so dissimilar to the acids in their properties, should have nearly the same influence in imparting to water the power of acting on metals. This singular fact can only be accounted for by supposing that, by their union, they give to the water more instability, on the principles I have explained, and render it more liable to be decomposed by the metals. Aluminum does not decompose water at common temperatures, and only slowly at a boiling heat, but it dissolves rapidly in dilute acids, and also in solutions of caustic alkalies, with the evolution of hydrogen gas, from the water being decomposed. If iron filings be gently heated with hydrate of potash, hydrogen gas will be given off. Here the decomposition of the water cannot be traced to the influence of any disposing influence from the action of the resulting compounds, and it must be entirely owing to the diminished affinity in the elements of the water. To the same principle we must ascribe the effect of alkaline solutions in the galvanic battery, where they rapidly corrode the metals and increase the intensity of the electric currents. In the soil, alkalies exercise a similar action on the vegetable matter or humus, and thus increase the energy of the feeble electric currents which circulate along growing plants, and which I shall prove to be identical with their vital principle. Their action must cause humus to decay more rapidly, a fact which seems generally admitted, and they act in the same manner on other vegetable substances. Gallic acid, hæmatin and many other substances, may be dissolved in water and yet remain unaltered; but if a free alkali be present they combine with oxygen and are converted into a brown substance, evolving at the same time carbonic acid. Even alcohol, which is not oxydated by the air at common temperatures, combines rapidly with oxygen on the addition of an alkali, and is converted into acetic acid, formic acid and other products of fermentation. Many persons may perhaps have noticed how quickly wood decays when placed in contact with ashes; and the fact that the most durable timber contains the least amount of alkaline bases, seems

to show that their presence, even in a small quantity, accelerates vegetable decay or putrefaction.

Lime and several calcareous salts exert a similar influence on chemical combinations, but their effect is less powerful, and though incapable of causing the action of water on metals in any perceptible degree, they are sufficient to control the more equally balanced forces which retain the elements of water together, and which dispose the humus of the soil to combine with oxygen. They accordingly promote the oxydation of the humus, and convert it into carbonic acid. Hence arise their stimulating effects, which principally consist in increasing the galvanic action to which I have alluded. It is generally admitted that lime causes vegetable matter to disappear more rapidly from the soil than it otherwise would do. To this agency, as well as to the influence of electric forces, to be afterward described, we may attribute the remarkable fact, stated on the authority of Mr. Ruffin, that the waters in limestone districts in Virginia are very transparent, while in other localities they are colored with vegetable matter.

In another place I shall dwell more particularly on the action of mineral manures, but here it seems important to establish the law which may give us a clue to their fertilizing properties. "Chemistry," says Berzelius, "has not yet explained, in a satisfactory manner, the power which lime thus exerts in vegetation; however, it is known that when the soil contains this alkaline earth, or in its place ashes only, the mold is quickly consumed, and vegetation becomes rich in proportion." A careful perusal of the writings of Johnston, Boussingalt, Liebig, Ruffin, Thaer, &c., on the subject of mineral manures, will show the truth of the candid admission of that able chemist, and of his assertion in regard to the consumption of vegetable mold.

The properties which I have here noticed as belonging to acid and alkalies, seem also to extend to chloride of sodium and to other soluble salts. It is well known that, when dissolved in water, common sea salt rapidly corrodes metals, not only by supplying them with chlorine, but also by causing them to separate oxygen from the water. In the galvanic battery it is sometimes used to act on the metals, and then hydrogen is evolved, which shows that the water is decomposed. It acts in a similar manner on vegetable compounds, and causes them to decay rapidly, notwithstanding its great power in preserving animal bodies. When mixed with flour, in a moist state, it has the power of inducing a fermentation, which renders it capable of supplying the place of yeast in making bread; and in the manufacture of kraut it acts in a similar manner on the cabbage which is employed, and causes a fermentation which is only checked by reducing the temperature below the freezing point. This property of salt appears to contribute, in some degree, to regulate the proportion of the carbon contained in the soil, the sea and in the air. During summer, the vegetable matter of the earth is generally in a state of fermentation or decay.

These changes take place in the vegetable matter contained in the soil, and even in large bodies of water, and the emission of carburetted hydrogen from stagnant pools proves that the water is decomposed to supply oxygen for the process. The saline substances which sea water holds in solution must accelerate this oxydation, and assist in transferring to the atmosphere the large amount of organic matter which rivers convey to the ocean.

I have already mentioned some facts tending to prove that acids retain their oxygen feebly when combined with water or other compounds. It may be further observed that a mixture of nitric and muriatic acid will corrode gold, which, as it is well known, resists either of these acids separately. A compound of nitric and sulphuric acids forms one of the most powerful oxydating agents. Its action on cotton and several substances has been lately investigated by Professor Schonbein. Iodine introduced into this mixture is rapidly oxydated and converted into iodic acid, and the addition of water causes the abundant disengagement of the duotoxide of nitrogen, and the liberation of iodine. Seldom indeed does water completely annul the affinity which retains the elements of acids, but there is much reason to suppose that it always diminishes the intensity of this power. It is, however, difficult to determine how this diminution is regulated, as the oxydation of metals does not afford any criterion in regard to it. Did no variation of this kind occur, the rapidity with which acid solutions act on metals would depend on the compliment of the acid contained in them, or in the film surrounding the metal; but, lessening the affinity of an acid in a very dilute solution, does not render the action as energetic as may be at first supposed.

By examining the chemical properties of the chlorides and the oxyds of metals, we obtain very satisfactory proof that solution exercises the same influence on the affinity between the elements of bodies as on that which subsists between the acids and bases of salts. Most of the metals have a more powerful affinity or attraction for chlorine than for oxygen, yet their chlorides, when dissolved in water, are generally decomposed by the action of the oxygen of the air, and are converted into metallic oxyds. Such changes are caused by the solubility of the former compounds, in consequence of which the affinity of their elements is weakened by the water, while no such effect is produced on the oxyds, which are for the most part insoluble. In this manner the chlorides of manganese, arsenic, vanadium and tungsten, when dissolved in water, are gradually converted into oxyds, the chlorine they contain being expelled by the oxygen. But a more evident illustration of the continual diminution of affinity by solution, is presented by the changes which take place in the chlorides of tin, antimony and bismuth, in similar circumstances. Though these compounds remain unaltered in a concentrated solution, they are decomposed by the addition of a large quantity of water, and the greater portion of them pass into metallic oxyds. This proves conclusively that affinity is weakened

by every addition of water when it dissolves the compounds. No such phenomena are to be witnessed in these when the chlorides and oxyds of the metals are alike soluble, as the affinities in both are equally subject to diminution. When the former compounds alone are insoluble, the changes are of a different character. Nitrate of silver and oxyd of mercury are both decomposed in solution by means of chlorine, and the insolubility of the resulting chlorides seems to co-operate in producing the decomposition.

It may be supposed that if every addition of water operated in the manner I have stated, a large amount of it should finally destroy the chemical affinity of all bodies and cause their spontaneous decomposition. This conclusion, however, does not necessarily follow. From the doctrine of gravitation, we learn that a force may continually diminish without being destroyed. The attraction of the earth on bodies decreases as they are distant from its center, yet it is never completely reduced to nothing, and though every increase in the distance must produce a variation in the intensity of the force the variation is insignificant when the distance becomes immensely great. Without assigning a law for the diminution of affinity, there is reason to believe that it cannot exceed a certain limit, and that when the amount of water becomes very large every successive addition has less effect than before. This opinion accords with the fact that water is separated at a less temperature from dilute than from concentrated solutions; which shows that in the latter the water exerts a greater controlling power in proportion to its quantity.

The necessity of recurring to numerous proofs will be removed by the information to be derived from the following contrivance which has been lately adopted for purifying liquids by means of galvanism. Two porous vessels containing water are partly immersed in the liquid to be purified, and a zinc plate placed in one vessel and an iron plate in the other. The zinc and iron plates being connected by a wire, a galvanic action is established, and the salts and other soluble matters are decomposed and removed, the positive elements or ingredients being transferred to one cup and the negative ones to the other. The galvanic current in this case must be exceedingly feeble, and this seems to indicate that the affinity between the elements of the salts and impurities must be weak in proportion. In connection with this it may be observed, that Becquerel, operating upon dilute solutions of salts, succeeded in effecting, by such feeble currents, the same decompositions as result from the highest energy of electricity; and Bird, proceeding in the same manner, obtained, in a separate and isolated form, boron, silicon, potassium, &c. From this we must conclude, that either affinity is diminished in a very great degree by solution, or that the most feeble electric excitement is capable of separating compounds which scarcely yield to the most powerful currents. If we adopt the latter opinion, we must believe that the several compounds which water dissolves must be continunlly decomposed by

the minute electric forces which are continually generated by different means. If we adopt the former, we must conclude that the carbonic acid dissolved in water must retain its oxygen so feebly that it is separated by every agent of decomposition.

Water in a state of purity is capable of holding, at the temperature of 60° F., about its own volume of carbonic acid; but river water generally contains only one-fiftieth of its volume, and in summer the quantity is much less. If, however, the extreme weakness of the solution facilitates the decomposition, it still renders the decomposition more difficult to be proved, as the quantity of carbon in the carbonic acid contained in a cubic foot of water, which does not generally exceed four or five grains, would be almost imperceptible in the fluid. Indirect evidence may, however, be obtained equally decisive of the question. A piece of litmus paper immersed in a solution of carbonic acid receives a red stain, but this stain is lost on exposure to the air. If a saturated solution of carbonic acid be exposed to the air for some time, the greater portion of this gas will be found no longer present in the water. We must necessarily conclude either that the carbonic acid was decomposed, or that the water, being rendered incapable of holding it, resigned it to the atmosphere. The latter opinion will be disproved by the fact that the water, when deprived of carbonic acid in this manner, is always capable of absorbing an additional portion before it is saturated. If the carbonic acid which is given off very slowly from fermenting substances be made to impregnate water, it will be found that, if a sufficient extent of aqueous surface be exposed to the air, the water may continually receive the fresh portions of gas without being rendered incapable of receiving any more, or without parting with any it had received. Indeed, all waters on the surface of the earth are found to have the power of retaining more carbonic acid than they possess, and are continually absorbing an additional supply from the air; yet they are never quite saturated. This proves that the carbonic acid must be continually decomposed in a small quantity. It also affords us a clue to the origin of the organic matter of which even distilled water contains a small quantity, and also of the sediment it deposits however carefully defended from the dust of the air.

More satisfactory proof is, however, furnished by the following experiment. If two plates of clear water be exposed to evaporate in the open air, and one be impregnated with carbonic acid, in the manner described in the Journal of Man, page 73, the plate containing the acidulated water will, after some days, have acquired a deposit several times greater than the other, though both must have the same opportunity of receiving dust from the air. The increased deposit could only have originated from the decomposition of the carbonic acid with which the water was impregnated.

Though the solar light may have some share in this operation on account of the diminution of affinity, yet the facts which have been noticed respecting galvanic action, must induce us to attribute

the principal part to this agent. In consequence of the evaporation which takes place, the surface of the water assumes a negative, and the vapor itself a positive, state of electricity. According to the principles of electro decomposition, the vapor acting as a positive electrode, must take away the oxygen, while the carbon must be retained at the negative. From the facts I have previously noticed it is evident, the feeblest development of electricity is not devoid of chemical influence, and Faraday has shown that surfaces in opposite states of electricity have the same effect in causing a decomposition as the poles of the galvanic battery.

This operation seems favored as much by the imperfect conducting power of the water as by the diminution of affinity. The electricity being too feeble to penetrate the water in any great degree is chiefly confined to the surface and is accordingly exerted with great advantage to decompose the carbonic acid, which is continually absorbed from the air. The evaporation of pure water gives less indications of electricity than that of saline solutions, chiefly because in the latter the excitement is communicated to all parts of the liquid and to the vessel containing it, while in pure water, which has little conducting power, the electricity is principally confined to the point of contact of the air and water surface, and is expended in decomposing either carbonic acid or perhaps the water itself. The latter supposition will not appear too unreasonable when we reflect, that the decomposition is effected by decomposing the several atoms of which a grain of water consists, and that the quantity of electricity expended in the decomposition of each atom is far less than that generated by the process I have described.

In a future article I shall prove by numerous facts, that a similar kind of action causes the purification of the air, and the formation of humus, peat and coal from carbonic acid. Though these proofs will be more satisfactory than I have given here, and though it was from them I deduced the theory I have advanced, yet it seemed to me necessary to show that my views are not only sustained by facts but that they strictly accord with the doctrines of chemistry.

VOLTAIC MECHANISM OF MAN.—Alfred Smee, F. R. S., Surgeon to the Bank of England, &c., has delivered an interesting lecture on Electro-Biology, or the Voltaic Mechanism of Man, at the London Institution, which has been reported in the London Lancet, for August, 1849. Mr. Smee contends that delicate Voltaic currents are produced in man by the action of the blood upon the brain and nervous system, and that he has been able to detect these currents in animals by a delicate galvanometer. All our sensations and muscular actions (he contends), originate galvanic currents in the nervous system— and "all organs of sensation constitute the positive pole," of an electric apparatus. His suggestions are quite plausible.

Brief Outlines of Neurology.

IN FOUR PARTS.

PART I.—PRACTICAL PHRENOLOGY. PART II.—CEREBRAL PHYSIOLOGY. PART III.—PHYSIOGNOMY AND PATHOGNOMY. PART IV.—NEUROLOGICAL PHILOSOPHY.

Part I.—Practical Phrenology.

CHAPTER I.—FRONTAL REGION—LOCATION AND FUNCTIONS OF THE INTELLECTUAL ORGANS.

In studying men as we find them in society, the subject which generally interests us first is the amount of *intellect* or *talent*. These are commonly confounded, and the mistake leads to serious evils in education, but intellect and talent are materially different. By intellect we mean the action of the merely intellectual organs—the organs which perceive, recollect, reason, imagine and invent. But by talent we refer to the sum-total of a man's powers arising from the action of his whole brain. Intellect is, perhaps, the most conspicuous element of talent, but intellect alone does not produce great talents. The merely intellectual faculties would not make a great military man, a great orator, statesman or master spirit, in any department. Greatness belongs to the whole man—talent requires certain executive powers and certain qualities of temperament, without which mere intellectual development is very inefficient.

To determine one's talents, then, we should consider the whole man after first surveying his intellectual organs.

The common supposition, that we can determine the amount of intellect by the height or the area of the forehead, is a decided error. It is the *prominence*, not the *superficial area*, of the front lobe which gives the most decisive indication of intellect.

The first step then is to determine the amount of prominence of the front lobe of the brain, which contains the intellectual organs. Observe how much the forehead projects in front of the ears. Measure its prominence if you wish to be accurate, by placing one foot of the callipers in the ear and the other on the forehead. If the development be very large, it will measure 4.8 or 5 inches to the base of the forehead, just above the root of the nose—5.1 to the center of the forehead, and 5.4 or 5.5 to the upper part of the forehead on the median line.

You can generally judge with sufficient accuracy by the eye in looking at the profile of the head. In the double profile (Fig. 1.)

the head indicated by the interior profile would commonly be supposed the most intellectual, because it has the highest forehead, but this would be a great error, as we perceive that the only difference between the two in development is, that the head indicated by the exterior profile has a larger development of the central and lower part of the front lobe, giving great additional vigor and clearness of thought, although the forehead is lower and narrower.

In ascertaining the development of the front lobe, we may also observe its prominence or projection over the face. A large front lobe generally produces a jutting forehead, overhanging the eyes and face in a marked manner. The eyes often appear deep set in consequence, as in the head of Daniel Webster (Fig. 2). In idiotic or unintellectual heads, the eyes are sometimes left prominent in consequence of the deficiency of the front lobe, which should overhang them. (See Idiot, Fig. 3.)

This matter will be better understood by looking at a skull. In the front view we observe the depth of the sockets, and the amount of the front lobe resting on the super-orbitar plate of the frontal bone which over-arches the sockets. The depth of the socket or orbit of the eye, shows the extent of the basis upon which the front lobe rests, and therefore gives a good index of its development. In the living individual, notwithstanding the presence of the eye, we may form a pretty good conception of the extent of the sockets and consequent extent of the organs resting above. The ample space around the eye in such heads as those of Washington, indicates the ample development of his intellectual organs—especially those lying at the basis of the front lobe. In this respect it is instructive to look at the heads of Washington and the great astronomer Laplace, as examples of large intellectual development, or at the contrast between Dr. Samuel Johnson and his obsequious biographer, Boswell (Figs. 4 and 5).

Height of the Forehead.—Having thus determined by the prominence of the forehead, the amount of intellectual power, we should next observe its height and breadth. A prominent forehead has more positive intellect—can grasp more forcibly any subject presented, can penetrate more profoundly and can command a much greater mass of knowledge, but still the faculties imparted by height and breadth are extremely important. The high forehead has a larger development of Liberality, Sympathy, Expression, Mirth or Humor, Pliability and Imagination. It indicates therefore a more genial, pleasant cast of mind, adapted not merely to the study of the fixed and rigid truths of the physical world, but to the appreciation of man in all his moods and manifestations. Human nature is not to be studied, like chemistry or mathematics, in a stern and rigid frame of mind. There is a vast deal in man and in society which can be appreciated only by a sympathetic, pliable being, who can forget the fixed constitution of his own mind and habits, when he enters into the contemplation of another's. Those organs, then, which elevate the forehead, elevate the range of the mind, fitting it

to move in the sphere of psychology and moral philosophy—and, in daily life, give that pleasantness, tact, sympathy and mutual adaptation among men, which is the very foundation of social intercourse. Thus, as these organs render the intellect pleasant, genial and appreciative in its manifestations, they elevate the man from a narrow sphere of bigoted opinions to a catholic range of thought which would otherwise be impracticable. Many learned and intellectual men, from the lack of these organs, are led into great errors of opinion, because they cannot appreciate that which comes from other minds. When the head is depressed and contracted just above the intellectual organs, the intellect operates in a more bigoted and contracted manner than when the proper proportions are preserved.

BREADTH OF FOREHEAD.—The breadth of the forehead, although it does not increase the actual force of the intellect, greatly increases its copiousness and activity, giving a creative, reproductive power which does not belong to the narrow forehead. The broad forehead is more inventive, ingenious, original, better adapted to literary pursuits, and more capable of attaining intellectual distinction.

The narrow, prominent forehead excels in thoughts that are *simple* and direct—the broad in thoughts that are *compound* or complex. The one is quick and penetrating, adapted to active life—the other more meditative, abstract and fitted for the cultivation of the arts and sciences. The former has the species of intellect most conspicuous in the great men who influence the world's destiny by action—the latter in those who lead it in philosophy, literature, art, science and refinement.

In Gall, Harvey, Kepler, Bacon, Newton, Watt, &c., a remarkable breadth of the forehead was the source of their originality of thought. In all men of strong minds we see the effect of the prominent forehead. Let us now look at the special organs.

SECTION I.—LATERAL INTELLECTUAL REGION—ORGANS OF COMBINATION.

CALCULATION.—A development at the external angle of the brow, indicates a talent for numerical combination or calculation. The primitive conceptions are furnished by the organs of Form, Size, Distance and Weight, which conceptions the organ of CALCULATION combines in mathematical processes. The organ lies just behind and above the external angular process of the frontal bone.

LANGUAGE.—Behind and below the organ of Calculation lies that of Language, which combines in words those visible and audible symbols of thought which constitute a language. This location is a little further back than that assigned by Gall and Spurzheim, but it corresponds more nearly to the true position of the organ of Language at the basis of the front lobe, as may easily be shown upon a skull. This organ gives command of language, but is not the source of loquacity or the propensity to talk, which is found among the animal organs described in Part II (Cerebral Physiology).

INVENTION.—The organ immediately above Calculation is that of INVENTION, which combines both forms and movements but more especially the former, and thus originates machinery, architecture, &c. This organ indicates mechanical talent. But, in selecting the mechanic, we should look not merely to his inventive power, but to his accuracy of conception and quickness of eye, derived from the perceptive organs—Form, Size, Weight, &c. We should also look to the signs of physical dexterity in the organ of Sense of Force lying in the brow just under Order. He who has talent to invent with accuracy of perception and dexterity to execute, is qualified for mechanical and artistic excellence. (INVENTION corresponds to the CONSTRUCTIVENESS of the Gallian system, which has been located too far back heretofore.)

COMPOSITION.—LITERARY ABILITY is indicated by a development a little further back than that of Invention. At the blending of the mechanical talent with Ideality, we find the talent for literature or power of constructing sentences with facility. Those in whom this organ is the most conspicuous, excel at school in composition, although they may be inferior in other exercises and studies. Those in whom it is defective, display their intellectual powers in any other way with more pleasure and with more vigor than by the pen. There are many individuals who display fine talents upon paper, in consequence of possessing the literary ability, which is furnished by the organ of Composition, who cannot either in action or speech make any strong impression upon the minds of others—and there are many of imposing appearance and manners who disappoint us sadly by their feeble efforts upon paper: one of the causes is to be found in the organ of Composition—the other in the fact that the literati have more of Tranquillity, Patience and Application, while the men of action alone have more of Energy, Restlessness, Vitality, &c. Their intellect must act in co-operation with their large animal forces, while in the others it co-operates with the organs which have a tranquil tendency.

SCHEMING.—The ability to plan and arrange on a large scale—to combine many things to effect a distant result—to arrange principles into philosophical systems, and to harmonize all things to the results which we have in view—belongs to the organ of Scheming or Planning, which co-operates with the organs of Foresight and Sagacity, organs of simple conception, to which this adds combination. Foresight and Sagacity are generally much more conspicuous among men of active life than the ability to lay an original plan. The highest planning power is generally found among those of contemplative habits, among whom indeed this power often runs into that excess denominated "castle building"—planning for amusement things never to be realized. The organ of Scheming or Planning lies just above Invention, and is a similar power of a higher grade, as Invention itself is a grade above Calculation. The three—Calculation, Invention, Scheming—illustrate beautifully the ascent from the local and physical to the general and abstract, as

we rise among the intellectual organs. The first gives breadth to the lower, the second to the middle, and the third to the upper portion of the forehead.

ORIGINALITY AND ECCENTRICITY.—These qualities belong of course to the breadth of the upper part of the forehead—a region which gives such a fertility of resources, such a capacity for evolving something new, as to make it easier to strike out a new course than to follow example and habit. Hence we see individuals who are naturally and almost unconsciously eccentric from their intellectual constitution. In other cases men become conspicuously eccentric, because their Imitation is overruled by Combativeness or Opposition, and because their Reverence or respect for society is overruled by their Vanity and Arrogance. The intellectual development leading to Originality and Eccentricity, is located just behind Scheming in the Ideal region.

ORDER AND SYSTEM.—The organs of Order and System give a square appearance to the forehead. They are situated at its exterior part adjacent to the temporal arch, which rises from the external angular process of the brow and separates the organs of Order and System in front, from those of Calculation and Invention on the lateral aspect. Order leads to great exactness, neatness and symmetry, especially in forms and arrangement of objects. System leads to exact and judicious arrangement, not merely of objects but also of actions, business and engagements—thus preventing confusion and loss of time. It greatly assists the memory and improves the power of narrating. The man of Order is neat in his dress and furniture. Every thing he makes or does is characterized by symmetry and exactness. The man of System shows an orderly and symmetrical arrangement in everything, although he may not have that exactness in physical details which belongs to the man of order. He is apt to have regular hours and regular duties. He does not undertake anything without a plan of operations. In some cases the plan and arrangement attract more attention than the real object of pursuit—especially in military life, where the habits of discipline encourage a love of system and order. But this is a rare fault—our *go ahead* Americans are too apt to disregard all system and order in their eagerness to obtain their objects.

INGENUITY.—Between the organs of Reasoning and of Scheming, the intellectual manifestations may be expressed by the term Ingenuity. In this location the Reasoning faculty acquires that power of combination, that management of correlations, which is shown in ingenious speculations, paradox, antithesis, wit and criticism. It gives a fondness for complete doctrines, propositions and systems—and fits for criticism in science, philosophy and literature, as Order does in mechanism and the arts.

The three organs of Order, System and Ingenuity, do not contribute much to increase the entire breadth of the forehead; but, by rendering the angles more prominent, thus producing a square form, they increase its breadth anterior to Ideality, so that the forehead

presents instead of a regular curve a nearly straight surface in front, and another flat surface on the sides.

IDEALITY AND IMAGINATION.—The organ of Ideality gives breadth to the posterior or outer portion of the forehead. The organ of Imagination gives elevation to the outer portion of the forehead above the organs of Reason, Ingenuity, Scheming and Ideality. A line drawn through Calculation, Invention and Scheming, would cross the organ of Imagination, when prolonged. Imagination is (as the position of the organ indicates) the highest form of the combining creative power—the lowest forms of which are found in Order, Calculation and the physical dexterity of the organ of the Sense of Force.

The difference between Imagination and Ideality has been too often overlooked. The former is a brilliant, creative, suggestive, copious faculty, which gives readiness, clearness and force, to all the conceptions, and produces that spontaneous activity which is continually reproducing our past impressions in new forms. It is (in connection with the upper portion of Ideality) the organ of GENIUS, if any organ is entitled to that name. The favorite exercise of Imagination is in fiction, and it is the principal source of novels, poetry and figures of speech. It is also essential to eloquence, to philosophy, and to original investigation and discovery. Reasoning and inventing require the continual use of suppositions. Reasoning either proceeds upon the fact that *this* is so and consequently *that* must be so, or it proceeds upon the *supposition* that *if* this be so *that* must be so. Invention requires continually the expression—*if* I make this arrangement what will be the consequences. Thus, Imagination is just as necessary as perception and induction to the highest walks of philosophy and science. The disposition to cry up induction and cry down imagination, indicates but little knowledge of the most successful and useful exercises of human talent.

The region which we call Ideality is congenial in function with that of Imagination, with which it connects. The intellectual action of Ideality is more contemplative—more inclined to reverie and dreams—more delicate, obscure, mystical, uncertain. The idealist seeks, in philosophy, that which is obscure, profound, shadowy, transcendental, supernatural—in nature, that which is delicate, beautiful, gentle, refined—in art, he seeks unattainable excellence—in literature, that delicate richness of style, which renders each line pregnant with innumerable beautiful associations of thought.

While this is the general character of Ideality—the different portions of the organ have different tendencies. The lower portion, connecting with Somnolence, gives the power of abstraction, meditation, &c., which is necessary to intellectual pursuits. Those who have this breadth of the temples behind the organ of Invention, are much more competent to carry on trains of independent thought in the midst of conversation and other interruptions. They are less dependent upon surrounding circumstances. When the lower Ideal region is defective, the mental action is too much under the guid-

ance of the perceptive organs. We may have great presence of mind, but for want of the power of abstraction, we are unable to isolate ourselves from surrounding influences—we are well calculated for observation, but not so well for study—we are more practical and direct—interested in the realities about us, and comparatively indifferent to literary and scientific matters, except so far as they are brought under our own observation.

MARVELOUSNESS.—Where Ideality connects with Imagination at the temporal arch, we find a fondness for the extraordinary, wonderful and supernatural. Breadth of the head at this point, indicates a fondness for those things which lie beyond the range of ordinary observation, and a willingness to believe them. This is the foundation of our faith in the supernatural, and in the wonders of science. It is necessary to bold inquiry and enlarged views. A deficiency renders us narrow minded, averse to enlarged views and difficult to convince of anything beyond the range of our own experience—doubt, skepticism and positive disbelief, are the effects.

SPIRITUALITY AND SPECTRAL ILLUSION.—There have been many among the superstitious and ignorant, addicted to a belief in ghosts and inclined to believe that they had witnessed supernatural phenomena. There have been others, even, among the most intelligent and talented, who have been for a short time, or even for many years, troubled by spectral illusions; strange and unreal forms have attended their steps—imaginary visitors have entered their apartments—horrible and threatening visages have hovered near them. In the former case ignorance combined with Marvelousness, or with excessive Faith, was the source of the superstition and a predominant Imagination lent much assistance. In the latter case, the posterior portion of Imagination, adjacent to Marvelousness, was either unusually developed or unusually excited. Sometimes an unusual heat, or a slight inflammatory condition, may exist at this spot. From the function which it manifests when unrestrained, it may be denominated the organ of SPECTRAL ILLUSION. Its normal function, however, is simply intensely imaginative, tending to realize before the mind's eye its conceptions.

There is another phenomenon in this region, at the posterior part of Marvelousness and Ideality. Men of intelligence have believed that they held mental communion with the spirits of the deceased. This has occurred to many, not merely in visions, trances, dreams and somnolent conditions, but in their natural state of wakeful consciousness. These wonderful facts are explained by the discovery of the organ of SPIRITUALITY (Sp.), which predominates in such persons, and which qualifies the mind for spiritual perceptions. The true perceptive power lies in the intuitive or clairvoyant region, but the organ of Spirituality co-operates with it, and furnishes the proper mental condition for an appreciation of spiritualities. What may be the nature of the objects of these perceptions we need not now inquire. It is, however, certain, that if

we excite the organs of Spirituality and Intuition, in any impressible persons, they acquire the power of taking cognizance of spiritual beings, or holding communion with something which appears to them a distinct spiritual existence, not embodied in a material form. Those in whom the organ is large will be inclined to believe in its power, while those in whom it is small will, of course, be incredulous. The perceptions of this organ, however, may be produced in any highly impressible persons, whatever may have been their previous opinions as to spiritual beings.

SECTION II.—PROMINENCE OF THE FOREHEAD.

The organs which are purely intellectual, are indicated most decidedly by the prominence of the forehead. The portion of the forehead which is the most salient is also the seat of the purest intellect—the region of intuition lying in the median line. A prominence of the lower portion of the forehead indicates accuracy of perception. A prominence of the middle portion of the forehead indicates the power of retaining and repeating a large number of perceptions—a power of memory. A prominence of the upper portion of the forehead indicates strength of intellect, as shown by the capacity for generalizing, understanding and using, the conceptions furnished by the inferior organs. In a well balanced mind these three species of intellect exist in the proportion which is observed in a well formed forehead, the lower portion being slightly more protuberant than the upper portion, and the whole marked by symmetrical curves. This portion of the forehead upon the median line, is the organ of Intuition, and contains an intellectual power of the highest order. The organs across the upper portion of the forehead are named successively, as they lie on each side of the median line, Foresight, Sagacity, Judgment, Wit, Reason, Ingenuity and Scheming. The latter two have been already described among the organs which give breadth to the forehead.

Foresight.—A forehead prominent (in the reflective range) upon the median line, indicates great power, not in the way of retrospection or of analysis, but in the way of forecast. Those who have this development are remarkable for the sagacity with which they shape their own course, and with which they pronounce on the result of every enterprise undertaken by others. This talent is of the highest importance to success in life. To the physician it gives the important power of prognosis in disease. To the statesman and general it gives that accurate and intuitive judgment concerning future events, which is by far the most valuable talent for distinguished success. The action of this organ is not, like that of Reason, deliberate and slow; it is instantaneous, and often intuitive, giving a promptness and certainty of perception concerning the future, which compels us to act in obedience to its dictates, even when we do not clearly discern from what source they originate. It especially contributes to the quality which is called tact, which is ever ready on any emergency, to point out the

proper course, before the slow operations of reason have ascertained the facts or formed a conclusion.

The action of this organ, in connection with Ideality, Spirituality and Imagination, has frequently been manifested in the form of PRESENTIMENT. These presentiments have been rejected by science, as the delusions of imagination, and have been received by the ignorant with a superstitious veneration. We are compelled, by many facts, to admit that the faculty of foresight has sometimes, in the human mind, an extraordinary and intuitive action, the nature of which we are not able at present to analyze, but the results of which may be, in certain cases, as unerringly true as our common prediction that the sun will rise to-morrow. In either case the prediction may be based on facts, and the conclusion may have been attained by certain processes of reasoning; but, in the intuitive foresight or presentiments, the facts are not recollected, and the reasonings (if there are any) are performed with invisible rapidity. Those who have large foresight are accustomed to prediction, their mind habitually dwelling on the future rather than the past.

SAGACITY.—The organ next to Foresight gives a quick, clear, penetrating mind, adapted to acting upon the present rather than the future or the past, and requiring no great amount of material as the basis of its decisions, but deciding instantaneously upon whatever is presented before it. This faculty comes very near to what is often understood as "common sense."

JUDGMENT.—Exterior to Sagacity lies the organ of Judgment, the name of which serves to express its function. This has a more deliberate mode of action intermediate between simple sagacity and the deductions of reason. It must be recollected, however, that this organ alone will not constitute a sound judgment, although it gives the intellectual power necessary thereto. A sound judgment requires a proper balance in the various emotions and passions. If, for example, a man should be defective in the organ of acquisitiveness, his judgment would not be very good as to the accumulation of property; if deficient in the moral organs, his judgments would not be good upon questions of right or wrong. In short, if any of his affective organs are either deficient or excessive, his judgment will be biassed by that influence, on account of the deficient, imperfect or incorrect materials upon which it acts; and upon the same principle, the judgment may be defective from lack of knowledge, when the organs of perception and memory are defective, and the information is limited.

WIT.—Exterior to Judgment and vertically over the pupil of the eye, lies the organ of Wit, an organ which connects above with that of Mirthfulness, and below with Memory and Reason. The lower portion of the organ gives a shrewd, analytical intellect. The upper portion, connected with Mirthfulness, corresponds more nearly in its functions to the common modern meaning of the word wit. The idea conveyed by the word mother-wit, illustrates pretty well the functions of this organ. When it is the predominant or-

gan of the reflective group, it gives great power of analysis or analytical penetration.

Reasoning.—The organ of Reason lies exterior to that of Wit, and above the most external portion of Memory. The action of this organ is based on a more extensive survey of facts, and a more deliberate and careful scrutiny of probable, uncertain and hypothetical data, than that of the four organs first named. The organs near the median line are more concerned in giving positive decisions upon matters of fact. The organ of Reasoning is more engaged on questions of probability: the former more frequently decide questions for action, while the latter forms opinions, not so much for immediate action as for the general guidance of life.

The organ of Reasoning renders the mind much more susceptible of being influenced by the suggestions of others. It appreciates accurately the force of arguments which may be inconclusive separately, but which, in the aggregate, constitute a strong chain of evidence. Sagacity and Judgment are influenced by personal observation, by facts and by obvious suggestions, but do not enable us to appreciate an ingenious train of argument. Hence there are many who have strong minds, penetrating and prompt in their action, capable of striking, pithy or eloquent remarks, who are incapable of logical reasoning themselves, and equally incapable of feeling its force when used by others. And as the faculty of reasoning may sometimes be stronger than those of sagacity and judgment, we may have, in such cases, very sound reasoning from persons otherwise of very feeble minds.

Consciousness.—The center of the forehead, upon the median line, may be considered the very focus of intellectual action. It is called the organ of Consciousness. It gives life, power, brilliance and intensity to the whole of the mental manifestations, and is the direct antagonist of sleep. Its large development indicates not only mental activity and power, but wakefulness, which tends to diminish the necessary amount of sleep. When Consciousness is small the intellect lacks vividness and clearness: we are not intensely conscious of our mental life.

Intuition.—There have been many wonderful manifestations of mind, which are not explainable by any metaphysical, phrenological or physiological science hitherto established. The power of recognizing objects at a distance, without the use of our organs of sense—the power of knowing and understanding things of which we have not previously been informed—the power of knowing sympathetically what passes in the minds of others—and the power of predicting future events not definitely indicated by reason, have been so often demonstrated, and even subjected to scientific scrutiny, that we are compelled to recognize these extraordinary powers as inherent in the constitution of man. The rationale of these phenomena is attained when we recognize the existence of such a faculty as Intuition. We recognize this faculty as existing, like other faculties, in a certain portion of the human brain, belong-

ing to all human beings—capable of various degrees of development, and capable of extraordinary excitements in health or disease, which may produce extraordinary results. Indeed, many of the highest manifestations of Intuition have been made in morbid or abnormal conditions of the constitution.

The Intuitive Intellect is associated with that portion of the front lobe lying upon the median line, where the hemispheres face each other, and is indicated in its development upon a vertical line across the center of the forehead. This portion of the brain may be considered the special seat and center of intellectuality—that portion of the whole constitution of man with which the mind holds the most intimate connection. The prominence of this region indicates a pure and subtile intelligence, a vivid mental action, and intuitive power. The lower portion of the intuitive region, adjacent to the root of the nose, manifests itself in CLAIRVOYANCE, or the power of unlimited perception. The highest portion, connecting with the organ of Foresight, manifests itself in intuitive forecast, presentiment, PREVOYANCE, prediction. Immediately above the organ of Physical Clairvoyance, is manifested the highest power of clairvoyance which relates to mind. Hence, a prominence about half an inch above the nasal process, indicates the acute physiognomist, capable of reading the countenance at a glance, and perceiving, and even feeling, instantaneously the mental and moral condition of others. The intuitive intellect gives great expression and intelligence to the eye, remarkable tact in social intercourse or in public life, and an intellectual power which may be manifested by action or the expression of the eye, by those who are incapable of any adequate literary expression.

MEMORY.—Across the middle of the forehead we frequently observe a horizontal depression, occupying the position of the organ of Memory, between the perceptive and reflective organs. This generally indicates a feeble or impaired memory. The mind, in such cases, may be accurate as to perception, clear and sound in its judgments, and irresistible in its arguments, but it cannot possess a large storehouse of intellectual materials. General principles are recollected, details are forgotten. We may be able to recollect the ideas furnished by our more prominent organs, but we recollect very little of the conceptions of the smaller organs. In this case the memory may be assisted by a system of mnemonics, based on the most prominent organ of the individual. If Language, Calculation, Form, Distance or Color, should be well developed, we may retain important facts by associating them with words, numbers, places, objects or colors. It is injudicious in such cases to attempt the cultivation of memory alone: we should attempt to recollect only that which we understand.

When the middle of the forehead is prominent (or when the whole of the forehead has sufficient prominence to develop Memory), there is a remarkable capacity for repeating and retaining the ideas which have once passed through the mind. The inform-

ation of such individuals is copious and exact. Their scientific, literary or practical knowledge may become immense, and their strongest faculties will generally indicate the character of their acquisitions. If Calculation is large, they may have an immense memory of numbers and mathematical problems. If Reason is large, they may have an immense knowledge of philosophical principles and doctrines; if Mirthfulness, an immense fund of anecdotes. If Self-esteem and Vanity are large, they will excel in autobiography. If Irritability and Hatred are large, they will have an inexhaustible recollection of the faults and foibles of others.

In determining the power of Memory, we observe, first, the general prominence on the forehead; second, the comparative development of Memory and its neighboring organs; third,

THE SUBDIVISIONS OF MEMORY.—The organ of Memory extends from that of Consciousness, at the center of the forehead, horizontally toward those of Time and System. The portion adjacent to Consciousness and below Sagacity, has but a limited range of action—is well adapted to business pursuits, to the gathering of news and the acquisition of knowledge, but does not recall the past with sufficient force to constitute a tenacious memory. Pupils having this development, and with the other portions of the organ depressed, are quick in learning, but incapable of retaining long their acquisitions. The more exterior portion of the organ gives a greater power of retention. The portion below Reason confers the greatest capacity for the accumulation of scientific knowledge; and, acting in connection with Time and System, arranges, in chronological and systematic order, its immense acquisitions. We may say that the internal portion gives readiness, and the external, retentiveness of memory.

TIME.—The organ of Time, which may be considered a portion of that of Memory, gives us the power of noticing the lapse of time, thus preserving a chronological arrangement of facts, and enabling us to appreciate seasons and brief intervals of time as well as dates. The perception of brief intervals of time belongs to the lower portion of the organ. A large development of this organ renders a time piece unnecessary. Its deficiency renders us unconscious of the lapse of time, and even incapable of appreciating the rhythm of music and poetry. There are many who cannot be faithful to time in their engagements, or judge correctly of its lapse, or even mark correctly the time of music. The organ of Time may not give the memory of dates, without the assistance of Language or Calculation, but it does give an accurate recollection of the successive order of events.

PHENOMENA.—That portion of the brain lying above the organs of Form, Distance and Weight, and below Memory, manifests the power of recognizing CHANGES in the appearance of objects: viz., that portion above Form recognizes changes in the *forms* of objects, which changes or phenomena belong to the sciences of animal physiology, vegetable physiology and chemistry. The portion

above Distance and Weight, recognizes the changes which are on a larger scale, as in the phenomena of natural philosophy, geology and astronomy. Hence, the aptitude for the natural sciences will be found arranged as follows:—1, psychology, on the median line, in the region of Intuition; 2, physiology, next above the inner portion of Form; 3, botany, or vegetable physiology; 4, chemistry; 5, geology; 6, natural philosophy and astronomy.

Light and Shade.—The perceptive faculties recognized by Gall and Spurzheim in the brain, are not the lowest forms of intellectual action. Below the brow, immediately around the eyeball, we recognize the organs of Light and of Shade, which furnish the primitive conceptions upon which our knowledge of external objects depends. All things of the external world, excepting color, may be denoted by a combination of lights and shades. The development underneath the brow, directly over the pupil, indicates the organ of (the sense of) Light, which lies on the supra-orbitar plate, at the base of the front lobe, and which may be regarded as the primitive organ of Vision. The organ of Shade lies at the inner angle of the eye, connected with that of Light. The function of the organ of Light is, to receive the impression of a luminous medium. The function of Shade is, to adapt the eye to darkness, or to a small amount of light. A deficiency of this organ produces night-blindness; a deficiency of the former pro duces day-blindness, or disqualifies the eye for receiving impressions of a brilliant light. We may remark, that when the spaces between the eyes and at the inner end of the brow are prominent or well developed, the eyes have greater delicacy, and are better adapted to twilight or darkness. A great depression at the inner angle of the eye, indicates a deficiency of visual power in a dim light.

Form.—The portion of the forehead between the brows has hitherto been appropriated, by phrenologists, to Individuality or the perception of objects. This term is scarcely necessary, for the function ascribed to Individuality is really included in that of Form. We leave that portion of the organ on the median line, lying on the internal face of the front lobe, for a more delicate perceptive power, and recognize the organ of Form, at the inner end of the brow. This is the true "*sense of things*," or of objects. The conception of forms, apart from objects, lies in a more posterior portion of the organ, running back from the brow, along the base of the front lobe, and marked externally upon the nose. (See Director Organs.) The method of determining the size of the organ of Form, by the breadth between the eyes, is by no means correct. The eyes are separated in man by the ethmoid bone, not by the brain. The broader the ethmoid bone, the further apart the eyes must stand, whatever be the development of the organ of Form.

Distance.—External to Form we have the organ of Distance, blending with Size, underneath the superciliary ridge. The development of the brow downward, therefore, indicates the development of Size, giving great accuracy of perception. The prominence

indicates the faculty of Distance, which gives a capacity for extensive geographical knowledge. This, in connection with Form, constitutes the faculty of "Locality," for the knowledge of places. A large development of this organ gives us a perfect and intuitive knowledge of our position and course of movement, as the organ of Time does of the lapse of time. Hence, those in whom the inner part of the brow is prominent, excel as hunters, travelers, geographers, &c. The attachment to places does not depend upon Locality; nor, on the other hand, does it alone create the disposition to travel, although the gratification which it derives from seeing, furnishes a strong inducement.

WEIGHT.—The organ of Weight, exterior to Distance, gives us a capacity for conceiving and understanding mechanical forces, whether at rest or in action. It is not alone the source of muscular dexterity (which arises from the organ of the special sense of Force). It is essential, however, to our knowledge of all operations in which mechanical forces are concerned. In the construction of a bridge, of a hall or a machine, for instance, it enables us to calculate the solidity, equilibrium or strength of the materials.

COLOR.—The organ of Color, lying above the pupil of the eye, between the organ of Light and that of Time, gives us the capacity to perceive and enjoy colors. When this organ is small, we are unable to perceive more than two or three colors; when it is large, we delight in observing the varied harmonies of delicate tints. The predominant tendency of the organ is toward white; and it gives us a power of observing the utmost delicacy of tints and slightest shades of variation. Aside from the beauty of color in nature and in the arts, colors are very important in indicating vital and chemical changes. Complexion is even more important than the form of the countenance, in indicating changes of health and vitality. Each organ gives us special tastes and affinities for its appropriate colors.

SEC. III.—CLASSIFICATION OF THE INTELLECTUAL ORGANS.

From the preceeding remarks it is obvious, that the intellectual organs may be classified according either to the horizontal or the vertical method. By a horizontal division, we have three ranges—on the brow, the middle, and the upper region of the forehead—constituting the PERCEPTIVE, RECOLLECTIVE and REFLECTIVE Organs. By the vertical division we may also make three ranges—on the internal, middle and external, portion of each front lobe. The internal group, lying close to the median line, is distinguished by the promptness of its action and its peculiar adaptation to an active life. The external group upon the lateral surface of the forehead, is distinguished by its ingenious and elaborate method of action. The middle region, lying above the pupil of the eye, possesses in these respects an intermediate character. We may therefore, style the internal, middle and external regions of the forehead the ACTIVE, the DELIBERATE and the ELABORATE. (See Fig. 6.)

The intellect of the Active Group has an efficient off-hand action, well adapted to oratory, generalship, business, social intercourse and all forms of intellectual action needed in active life. The Elaborate Group is adapted to the life of the artist, philosopher, poet, mathematician, mechanician, theologian, author, and in short, to all sedentary intellectual pursuits. The Deliberate Group is neither adapted to the highest efforts of scholarship nor to the boldest display of practical talent, but occupies an intermediate sphere, as in the function of a judge, a counselor of state, or a superintendent of business.

The horizontal division, which forms the Perceptive, Recollective and Reflective Groups, presents, in the lower department, the organs of physical perception, by which the mind is brought into contact with the external world. If the line by which the Perceptive Group is bounded, be prolonged toward the ear, we may extend the group on in that direction, including the various senses, terminating in Alimentiveness, the organ of hunger and thirst. The Recollective Group, as it extends backward upon the forehead, includes the organs of System and Invention, and the lower portion of Ideality; which, although they are not strictly organs of memory, are nevertheless essentially recollective in their action. The tendency to reminiscence or reverie derived from the lower portion of Ideality, should always be borne in mind when we are estimating the manifestations of memory. The upper range, the Group of Reflective, Reasoning Organs, is the source of the highest order of talent, vastly superior to the mere knowledge and accuracy, which belong to the two inferior ranges, but still depending upon them for the materials of its action.

SEC. IV.—ORDER OF INTELLECTUAL ACTION.

We may now perceive that the natural order of intellectual action is from below upward, and from within outward. The physically perceptive intellect of the lower range receives impressions from external nature, which impressions, being held before the mind for mutual comparison and combination, by the power of memory, excite in the higher organs of the third range the general impressions, conceptions, judgments, or opinions which they are adapted to form. The power of recollection is dependent upon a previous perception; and the power of reflection is dependent upon the retention of our perceptions upon which we reflect.

Thus in the usual course of nature, a continual current of intellectual excitement is ascending from the lower to the higher regions of the forehead. In like manner the perceptive and intuitive powers of the median line are continually receiving impressions, which are, at first, but instantaneous perceptions, subject to the decision of Sagacity, but which, accumulating by the lapse of time, furnish the appropriate materials for the retentive memory and for Reason; and finally, the great mass of accumulated materials and dim impressions furnishes the appropriate pabulum of Ideality. The intellectual excitement is, therefore, continually passing backward

from the forehead in a horizontal and in a vertical direction. Hence manipulation over the forehead, upward and backward, in accordance with the natural course of mental action, exerts a rousing enlivening influence, while the reverse movement tends to produce somnolence.

SEC. V.—OF THE EXTERNAL SENSES.

The external senses which were almost entirely overlooked by Gall and Spurzheim, in their system of organology, have definite locations, in the anterior portions of the brain, to which they are as justly entitled as any of the faculties that belong to man. It is surprising that phrenologists should have passed over this matter so carelessly, and should have acquiesced so long in this important error or omission of Gall and Spurzheim.

Sense of Vision.—The most intellectual of the Senses, that of sight, has its location most anteriorly on the brow. The most animal of them, that of hunger and thirst, has its location most nearly adjacent to the ear. The sense of sight may be considered as originating in the organ marked Light, in connection with which the organs of Shade, Form, Size and Distance, Color, Order and Number, may be regarded as joint apparatus of vision. Vision is more prompt and accurate in proportion to the development at the root of the nose and inner end of the brow, the regions of Form and Intuition. It is more extensive in proportion to the development of the organ of Distance, and more delicate in proportion to the development of Shade and of the organ of Sensibility. When the region of Somnolence is large, there is a great liability to ocular illusions, as double vision, semi-vision, diminution of objects, and other distorted appearances.

Sense of Force.—Man regulates his muscular system by means of the consciousness, which he has of its action. Persons in whom even the sense of feeling is paralyzed in the hand, find it difficult to hold anything, because they are not sufficiently conscious of its presence unless they are constantly thinking of it. We need much more a muscular sense to make us conscious of the amount of our efforts in muscular action, and thus enable us to use our muscles as we design. This sense is called the sense of Force, and is located below the outer orbitar process, beneath the organ of Order. The organ of Weight gives us a knowledge of external resistance—that of Force makes us acquainted with our own power. It is the principal source of dexterity in the use of our limbs and in every species of exercise or manual employment. In riding, walking, fencing, skating, dancing, &c., it gives superiority.

The organ of the Sense of Hearing is located immediately behind that of Language and Music. Fullness of the temples at that point indicates acuteness of hearing and great capacity for acquiring knowledge by the ear, in conversation, lectures and the study of living languages. The relative developments of the organs of vision and hearing will determine the relative capacity for learn-

ing from the voice, as in lectures and conversation, or by the eye, as in reading and observation.

The SENSE OF FEELING is manifested by the region above the cheek bone, lying between Language and the upper portion of the ear. In this region we find every form of physical sensibility; anteriorly the senses of hearing, touch, taste and smell; next the sensibility to Electricity and Caloric, to Dryness and Moisture; and in the posterior region the Respiratory Sense, the Sense of Pain and Fatigue, and the sense of Hunger and Thirst. Fullness of the temples in the region marked "Sensibility" indicates an extremely sensitive constitution, easily affected by changes of the weather and other external impressions, easily affected by pain or fatigue, and quite liable to disease. But the sensitive constitution has the advantage of being distinctly aware of the approaches of disease, and feels so keenly the slightest deviation from the standard of health, that with a proper development of Caution and Foresight, the individual will be impelled to take care of himself and repel the first approaches of disease. The senses of hunger and thirst will be described under the head of Alimentiveness.

LETTER FROM A PHYSICIAN.—The following is an extract from the letter of a subscriber in Pennsylvania—an intelligent Physician:

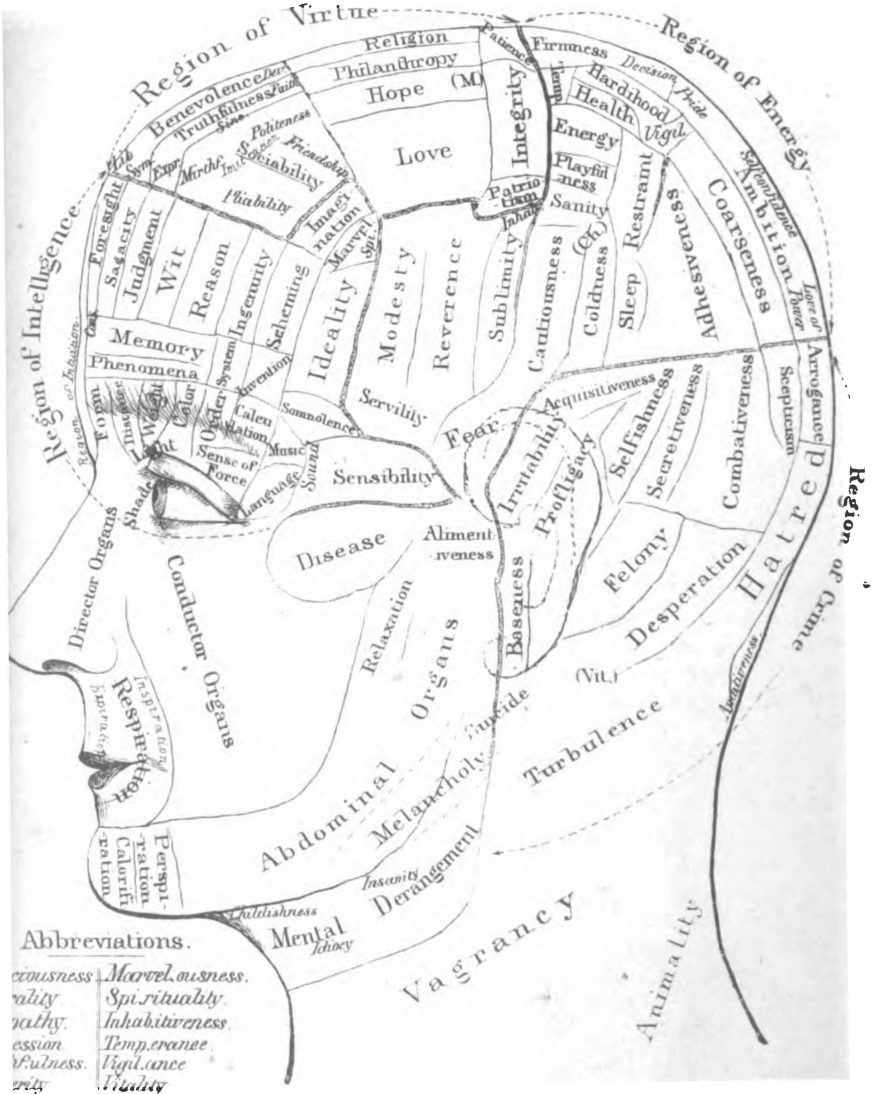
"I have read the 'Journal' with interest so far, and find much in it which, as a believer in 'Mesmerism,' I could not before understand, and await, with much anxiety, the coming numbers. I have frequently been mesmerized myself, and have often mesmerized others; but there has been so much imagination connected with my experiments, that when *truth did develop itself*, I hardly knew how to avail myself of it, and had almost come to the conclusion to give it up as a useless thing, until I read a few of the first numbers of your Journal, which appears to throw altogether a new light upon the subject, and I shall now (when my health permits) endeavor to push forward on the road to the full development of this much neglected *science*.

"I also think myself to be what may be called, according to the new science of neurology, an impressible subject. I have noticed, for the last two or three years, that whenever I make up a batch of Anti-Dyspeptic Pills, I have experienced a purgative effect, invariably; sometimes having three, and at other times five, evacuations. And when I handle extract of hyosciamus, if it is only for a few minutes, I feel its narcotic effects quite sensibly. Opium appears to have nearly the same effect, though not to so great an extent. I have also noticed that autographs have some effect upon me. For example, a few weeks ago I received a letter from my father, informing me of the death of a sister; and when the letter was placed in my hand, I felt a tingling sensation in the hand and arm, a sense of oppression in the region of the heart, and became so nervous that I could scarcely break the seal. There was no external sign to indicate that the letter contained anything to disturb me, being in the habit of receiving a letter from him every week or two, having precisely the same appearance. Had it not been for 'Psychometry,' I should have been unable to account for my feelings on that occasion—having naturally great power over my nerves, being able to control myself under the most exciting circumstances."

NEUROLOGICAL DIAGRAM

EXHIBITING

the localities of the cerebral organs as taught in the lectures of Dr J.R. BUCHANAN.



Abbreviations.

...ciousness	Marvelousness.
...rality	Spirituality.
...pathy.	Inhabitiveness.
...session	Temperance.
...fulness.	Vigilance
...rity	Vitality
...tedness	Mortality

M Brain.

Antagonism of the Cerebral Organs.

...ectual Organs - Strep Adhesiveness &c
...city - Acquisitiveness
...dence - Selfishness
...ulness - Secretiveness
...bility - Combativeness.
Hatred
Desperation
...uthropy - Felony
...on - Bad Temper
...ness - Irritability
...bility - Modesty & Reverence

Integrity - Baseness
Patriotism - Turbulence.
Firmness - Fear
Hardihood - Sensibility
Temperance - Alimentiveness
Health - Disease
Energy - Relaxation
Playfulness - Melancholy
Sanity - Ment. Derang.
Restraint - Conductor Org.s

Ideality - Coarseness
Imagination
Spirituality — } Scepticism
Marvelousness
Somnolence - Vigilance
Amativeness - Chastity (Ch.)
Color/Location } Coldness
Order
Animality - Sublimity
Vagrancy - Inhabitiveness
Vitality - Mortality